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Child Behavior, Animal Behavior,
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INDEX OF AUTHORS

Angermeier, Wilhelm Franz	153	Morgan, Elmer F., Jr.	309
Benimoff, Murray	185	Overton, Richard K.	171
Blum, Lucille Hollander	289	Phillips, E. Lakin	177
Brown, W. Lynn	75	Rosen, Joseph	145
Cassel, Russell N.	165	Rosenberg, B. G.	309
Chase, Richard Allen	101	Saxon, Sue V.	277, 283
Combs, Ronald H.	171	Scott, J. P.	3
Crandall, Vaughn J.	29	Sines, J. O.	261
Darley, Frederic L.	41	Smith, Madorah E.	129
Donahoe, John W.	23	Solomon, Dan	29
Elkind, David	51, 209, 269	Stephens, William N.	59
Elliot, Orville	3	Stern, John A.	89
First, Daphne	101	Stevenson, Harold W.	253
Geller, Max	289	Stevenson, Nancy G.	253
Horrocks, John E.	185	Stout, Robert J.	171
James, W. T.	153	Sutton, Samuel	101
Kasdon, Lawrence M.	129	Sutton-Smith, B.	309
Kellaway, Richard	29	Tuckman, Jacob	317
Levinson, Boris M.	235, 113	White, R. K.	75
Lorge, Irving	323	Williams, Gertrude J.	89
Lyle, J. G.	227	Winitz, Harris	41
Lynn, R.	159	Wright, Logan	245
Mason, William A.	301	Zeman, Frederic D.	317
McDowell, A. A.	75	Zimmerman, Donald W.	139
Meissner, W. W., S.J.	323, 65	Zubin, Joseph	101

TABLE OF CONTENTS

The development of emotional distress reactions to separation, in puppies	3
By ORVILLE ELLIOT AND J. P. SCOTT	
Changes in meaning as a function of age	23
By JOHN W. DONAHOE	
A comparison of the patterned and non-patterned probability learning of adolescent and early grade school-age children	29
By VAUGHN J. CRANDALL, DAN SOLOMON, AND RICHARD KELLAWAY	
Comparison of male and female kindergarten children on the WISC	41
By FREDERIC L. DARLEY AND HARRIS WINITZ	
The development of the additive composition of classes in the child: Piaget Replication Study III	51
By DAVID ELKIND	
Judgments by social workers on boys and mothers in fatherless families	59
By WILLIAM N. STEPHENS	
Some indications of sources of anxiety in adolescent boys	65
By W. W. MEISSNER, S.J.	
Oddity-reversal and delayed-response performance of monkeys previously exposed to focal-head irradiation	75
By A. A. McDOWELL, W. LYNN BROWN, AND R. K. WHITE	
The inner life of the extremely gifted child, as seen from the clinical setting	83
By BORIS M. LEVINSON	
The effects of relatively massed and spaced electroconvulsive shock on current runway performance in the male albino rat	89
By JOHN A. STERN AND GERTRUDE J. WILLIAMS	
A developmental study of changes in behavior under delayed auditory feedback	101
By RICHARD ALLEN CHASE, SAMUEL SUTTON, DAPHNE FIRST, AND JOSEPH ZUBIN	
Parental achievement drives for preschool children, The Vineland Social Maturity Scale, and the social deviation quotient	113
By BORIS M. LEVINSON	
Progress in the use of English after twenty years by children of Filipino and Japanese ancestry in Hawaii	129
By MADORAH E. SMITH AND LAWRENCE M. KASDON	
The effect of deprivation and satiation on secondary reinforcement developed by two methods	139
By DONALD W. ZIMMERMAN	
Dominance behavior of the adult rat as a function of early social experience	145
By JOSEPH ROSEN	
The influence of early sensory-social deprivation on the social operant in dogs	153
By WILHELM FRANZ ANGERMEIER AND W. T. JAMES	

Personality characteristics of the mothers of aggressive and unaggressive children	159
By R. LYNN	
A construct validity study on a leadership and a social insight tests for 200 college freshmen students	165
By RUSSELL N. CASSEL	
Change in sense modality as a factor in retroactive inhibition	171
By RONALD H. COMBS, ROBERT J. STOUT, AND RICHARD K. OVERTON	
BOOKS	177
NEILL, A. S. Summerhill: A Radical Approach to Child Rearing. (Reviewed by E. LAKIN PHILLIPS)	177
BOOKS RECENTLY PUBLISHED	179
A developmental study of relative needs satisfactions of youth: equilibrium—disequilibrium	185
By MURRAY BENIMOFF AND JOHN E. HORROCKS	
• The child's conception of his religious denomination: I. The Jewish Child	209
By DAVID ELKIND	
A comparison of the verbal intelligence of normal and imbecile children	227
By J. G. LYLE	
The vocational interests of Yeshiva College freshmen	235
By BORIS M. LEVINSON	
A study of special abilities in identical twins	245
By LOGAN WRIGHT	
A method for simultaneous observation and analysis of children's behavior	253
By HAROLD W. STEVENSON AND NANCY G. STEVENSON	
The effects of electroconvulsive shock on emotionality and autonomic response to subsequent stress in the rat	261
By J. O. SINES	
Children's conceptions of right and left: IV. Piaget Replication Study	269
By DAVID ELKIND	
Effects of asphyxia neonatorum on behavior in the rhesus monkey	277
By SUE V. SAXON	
Differences in reactivity between asphyxial and normal rhesus monkeys	283
By SUE V. SAXON	
Toward a closer alliance between psychoanalytic and genetic schools of psychology	289
By LUCILLE HOLLANDER BLUM AND MAX GELLER	
Effects of age and stimulus characteristics on manipulatory responsiveness of monkeys raised in a restricted environment	301
By WILLIAM A. MASON	
Historical changes in the freedom with which children express themselves on personality inventories	309
By B. SUTTON-SMITH, B. G. ROSENBERG, AND ELMER F. MORGAN, JR.	
The self-image in aging	317
By JACOB TUCKMAN, IRVING LORGE, AND FREDERIC D. ZEMAN	

Comparison of anxiety patterns in adolescent boys: 1939-1959	323
By W. W. MEISSNER, S.J.	
BOOKS	331
BOOKS RECENTLY PUBLISHED	331

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Genetic Psychology Monographs (continued)

VOLUME 46—July-December, 1952

1. The relationship of social status, intelligence, and sex of 10- and 11-year-old children to an awareness of poverty—**F. J. ESTYAN**
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VOLUME 47—January-June, 1953

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VOLUME 49—January-June, 1954

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Genetic Psychology Monographs (continued)

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(Manuscripts are printed in the order of final acceptance)

- The development of emotional distress reactions to separation, in puppies . . . 3
BY ORVILLE ELLIOT AND J. P. SCOTT
- Changes in meaning as a function of age 23
BY JOHN W. DONAHOE
- A comparison of the patterned and non-patterned probability learning
of adolescent and early grade school-age children 29
BY VAUGHN J. CRANDALL, DAN SOLOMON, AND RICHARD KELLAWAY
- Comparison of male and female kindergarten children on the WISC . . . 41
BY FREDERIC L. DARLEY AND HARRIS WINITZ
- The development of the additive composition of classes in the child: Piaget
Replication Study III 51
BY DAVID ELKIND

(OVER)

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Judgments by social workers on boys and mothers in fatherless families	59
BY WILLIAM N. STEPHENS	
Some indications of sources of anxiety in adolescent boys	65
BY W. W. MEISSNER, S.J.	
Oddity-reversal and delayed-response performance of monkeys previously exposed to focal-head irradiation	75
BY A. A. McDOWELL, W. LYNN BROWN, AND R. K. WHITE	
The inner life of the extremely gifted child, as seen from the clinical setting	83
BY BORIS M. LEVINSON	
The effects of relatively massed and spaced electroconvulsive shock on concurrent runway performance in the male albino rat	89
BY JOHN A. STERN AND GERTRUDE J. WILLIAMS	
A developmental study of changes in behavior under delayed auditory feedback	101
BY RICHARD ALLEN CHASE, SAMUEL SUTTON, DAPHNE FIRST, AND JOSEPH ZUBIN	
Parental achievement drives for preschool children, The Vineland Social Maturity Scale, and the social deviation quotient	113
BY BORIS M. LEVINSON	
Progress in the use of English after twenty years by children of Filipino and Japanese ancestry in Hawaii	129
BY MADORAH E. SMITH AND LAWRENCE M. KASDON	
The effect of deprivation and satiation on secondary reinforcement developed by two methods	139
BY DONALD W. ZIMMERMAN	
Dominance behavior of the adult rat as a function of early social experience	145
BY JOSEPH ROSEN	
The influence of early sensory-social deprivation on the social operant in dogs	153
BY WILHELM FRANZ ANGERMEIER AND W. T. JAMES	
Personality characteristics of the mothers of aggressive and unaggressive children	159
BY R. LYNN	
A construct validity study on a leadership and a social insight tests for 200 college freshmen students	165
BY RUSSELL N. CASSEL	
Change in sense modality as a factor in retroactive inhibition	171
BY RONALD H. COMBS, ROBERT J. STOUT, AND RICHARD K. OVERTON	
BOOKS	177
NEILL, A. S. Summerhill: A Radical Approach to Child Rearing. (Reviewed by E. LAKIN PHILLIPS)	177
BOOKS RECENTLY PUBLISHED	179

THE DEVELOPMENT OF EMOTIONAL DISTRESS REACTIONS TO SEPARATION, IN PUPPIES*¹

Roscoe B. Jackson Memorial Laboratory

ORVILLE ELLIOT² AND J. P. SCOTT

A. INTRODUCTION

This investigation is concerned with the direction and degree of changes in vocalization and activity in puppies, as related to the factors of isolation, familiarity, habituation, and age.

When young puppies are distressed they usually begin to emit a series of rapid sounds, commonly called whines or yelps. This kind of behavior can be classified as *et-epimeletic* or *care-soliciting* behavior. Unable to adapt to a situation, the young animal calls for help and attention. The crying of human babies is a similar type of behavior (19).

In the puppy, the number of vocalizations in a particular period of time provides an objective measure of the emotional state of the animal. Several different sorts of external and internal stimuli will produce yelping, and the particular one which is the subject of this experiment is that induced by separation of the puppy from its mother and litter mates, and removal to an unfamiliar room.

This study is part of a program of research on the effects of early emotional disturbance. For a young animal, being lost from its mother in unfamiliar territory is one of the most dangerous situations which can threaten its existence. It is also one of the extreme emotional experiences which is most likely to happen under reasonably natural conditions. There is every reason for believing that such experiences are highly disturbing to human children (4). The following experiment was intended to obtain a developmental baseline for the effects of separation. As will be seen from the data, there is one age at which a maximum effect is obtained, which is close to the normal time of final weaning and the end of the period of primary socialization.

* Received in the Editorial Office on August 26, 1959.

¹ This research was supported by a Ford Foundation Grant for the study of the interaction between genetic and early experiential factors affecting social behavior.

² Now at Department of Anthropology, Harvard University.

B. EXPERIMENTAL PROCEDURE

1. *Subjects*

The subjects in the experiment were 32 purebred beagle puppies from seven litters. Males and females were randomly assigned to the various experimental groups. Each litter of pups lived together as a group with the mother from birth to 13 weeks of age.

The experiment was repeated with eight cocker spaniel puppies from two litters and five puppies from a wire-haired fox terrier litter, in order to obtain indications of possible breed differences.

The subjects in the experiment received no treatment in addition to routine feeding and experimental testing.

2. *Apparatus*

The environments used as testing situations consisted of nursery rooms (18 × 13 feet) as described in Scott and Marston (21) and other rearing rooms approximately 10 × 8 feet. The larger pens were in the main laboratory at the station, while the smaller pens were in a building used at the time primarily for housing dogs and consequently subject to some outside disturbances throughout the testing. At this point it might be noted that there were no apparent differences in vocalization or other activity between tests run in the main building or in the building used for housing dogs.

Objects in the home pen were a nest box and ramp on opposite sides of the room with a bench in between. Also present were wall feeders, a water pan or pail, and shavings covering the floor. The strange pen was bare of these objects.

A tape recorder was used to check on the reliability of the hand recording of the vocalizations. The microphone was always placed in the center of the front wall of the room three feet from the floor in order to pick up any possible sounds that the tester might not have heard while standing outside of the room at the observation window. Use of the recorder made it possible to obtain data on the rate of vocalizations per minute throughout the 10-minute period and also to play sounds back to a decibel meter in order to get an estimate of variation in sound levels as related to age.

3. *Procedure*

The period of time during which the puppies were tested ran from three weeks to 12 weeks of age. The 32 beagle pups were divided into four groups of eight each. The first group was started at three weeks and ran

through to 12 weeks of age. The second group ran from six to 12 weeks inclusive. The third group ran from nine to 12 weeks of age. The fourth group was tested only at 12 weeks of age.

The pups were tested once a week in their home pen and once a week in a strange pen. The strange pen was the same size as the home pen. The first test of each week occurred on the weekly birthday of the group and the second test was given the following day. The trials were distributed so that the room order was reversed each week. The puppies were tested at the same hour each day.

The puppies and their mother were removed from the home pen and put in a holding cage in another part of the laboratory. The pup to be tested was removed from this holding cage, carried by the tester to the testing room and placed in the center of the floor. The puppy was unrestrained except that his movements were restricted to this room. After placing the pup in the center of the floor, the tester then left the room, shut the door, and observed the pup through a one-way vision window. The number of vocalizations per ten-minute period was then recorded on a hand tally as well as on the tape recorder.

A record was kept of the frequency of defecations and urinations in the test situation. At the beginning of the last 15 seconds of each minute the observer also noted whether the puppy was active or inactive at that instant. Thereafter, every movement of the puppy throughout this 15-second sequence was recorded.

At 13 weeks of age, one week after the end of the above testing, a handling test as described in Scott and Fuller (20) was given to the puppies to ascertain how they reacted to "typical handling procedures." The puppies were then weighed to determine if their physical development followed that of previous members of their strain as studied at the Roscoe B. Jackson Memorial Laboratory.

C. RESULTS

1. *Total Number of Vocalizations*

The reliability of recording the number of vocalizations was checked by running a correlation between number of vocalizations collected on the hand tally at the time of the test and the number heard on playback of the tape recording of the test session. The correlation (Pearson Product-Moment) yielded was .96. The probability of obtaining this result by accident of random sampling is $< .01$.

The room temperature as recorded at each 10-minute test session did not appear to have affected the vocalization or activity scores.

The mean number of vocalizations by beagles per 10-minute session is shown in Figure 1. The effects on vocalization of change in environment,

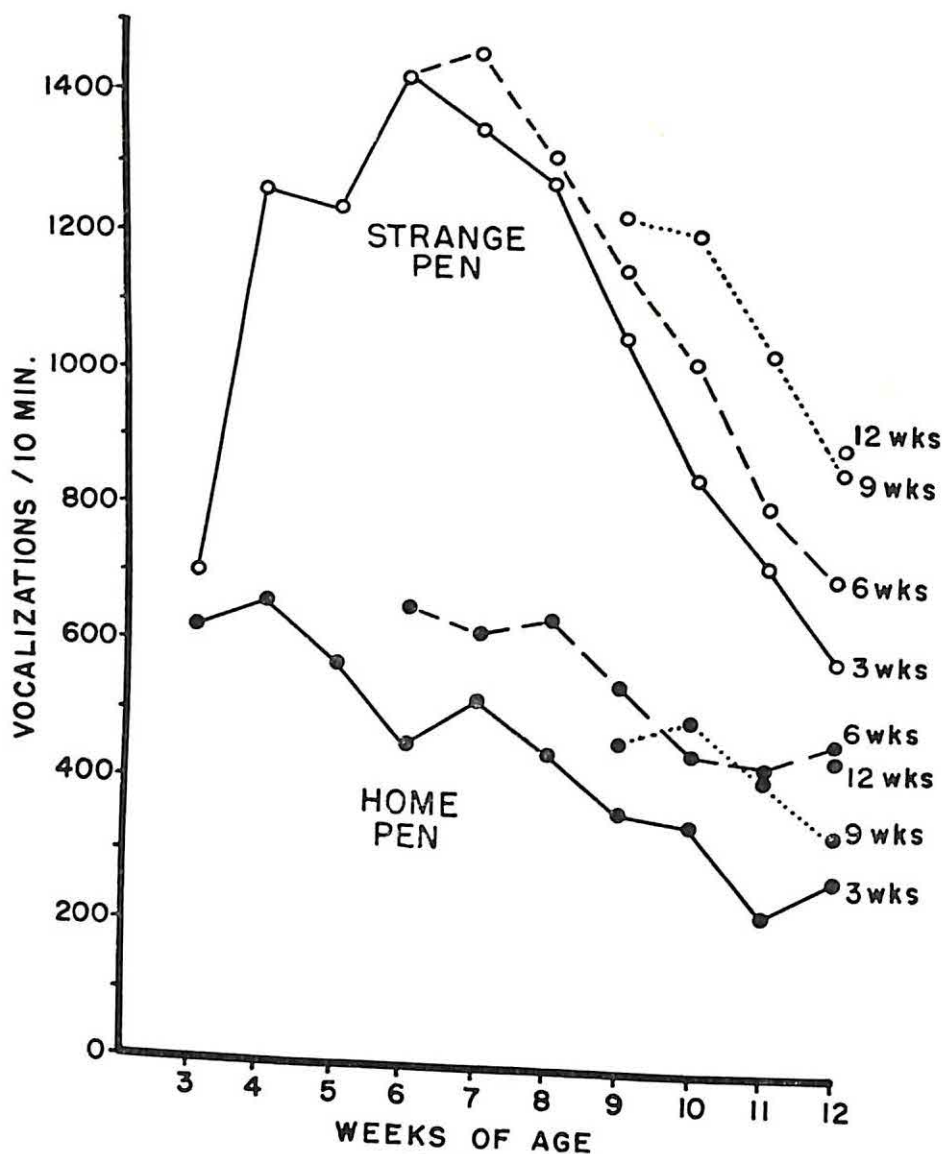


FIGURE 1

Average number of vocalizations at different ages. Note that vocalization in the home pen is uniformly lower than that in a strange pen. Puppies whose tests were begun at dates later than three weeks show a slightly higher rate of vocalization, but the curves are parallel.

week of age when tested, and age when started in test, were examined in detail by several analyses of variance of the scores transformed to stanines. This procedure eliminated the necessity of doing individual tests of significance between the various combinations of scores.

The detailed tables for these several analyses of variance are too numerous to present here, but the computations substantiate the impression given by the curves in Figure 1, with both "rooms in which tested" and "weeks of age" having a statistically significant effect. These findings confirm the results obtained in Causey's (5) pilot experiment. Table 1 shows that when all four groups are analyzed at the last testing week only, the difference among these groups becomes statistically significant and that most of this significance is due to linear regression.

TABLE 1
ANALYSIS OF VARIANCE OF VOCALIZATIONS PER TEN MINUTE PERIOD FOR BEAGLES
AT TWELVE WEEKS ON GROUPS STARTED AT THREE WEEKS, SIX WEEKS,
NINE WEEKS AND TWELVE WEEKS—IN STANINES

Source of variation	Sum of squares	df	Estimate of variance	F	Level of sig.
Groups	9.0	3	3.00	5.06	<.01
Groups $\times$ subjects (ss within groups)	16.6	28	.59		
Rooms	19.1	1	19.10	32.59	<.01
Rooms $\times$ groups	2.1	3	.70	1.19	—
Rooms $\times$ subjects	16.4	28	.59		
	63.2	63			
		(N-1)			
Regressions	6.49	1	6.49	10.94	<.01
Deviations	2.51	2	1.25	2.11	—
error	16.60	28	.59		

Individual Mann-Whitney U Tests were done comparing each group to the other groups at the various age levels in the vocalization scores for the strange pen only. There were no significant differences found among the groups until 10 weeks of age. The three weeks group is significantly different from the nine weeks group from this point on; the six and nine weeks groups begin to be significantly different at 11 weeks of age. At no point was the three weeks group significantly different from the six weeks group. However, the means of all groups show a consistent relationship to each other at all ages after six weeks, each later group showing a slightly higher score, with the curves subsequently running parallel to each other.

These data lead to several conclusions. The effect of isolation in the

home pen is greatest at three weeks of age, declining steadily thereafter, while the maximum effect of isolation in a strange pen occurs at six to seven weeks. These changes are largely the result of maturation, since animals started at later dates tend to follow the same curves. However, the later an animal is exposed to the situation, the greater the vocalization produced at any given age. This may be because the animals with previous experience are habituated, or because the introduction to a strange new experience is more distressing to an older animal.

By playing back the recording of one beagle's vocalizations to an H. H. Scott decibel meter we were able to obtain an indication of changes in volume from three to 12 weeks. The volume of vocalization showed an increase of 30 decibels from three to six weeks, remaining at that level until nine weeks and then decreasing afterwards nearly to the original level at three weeks. Since these readings were based solely on the recordings

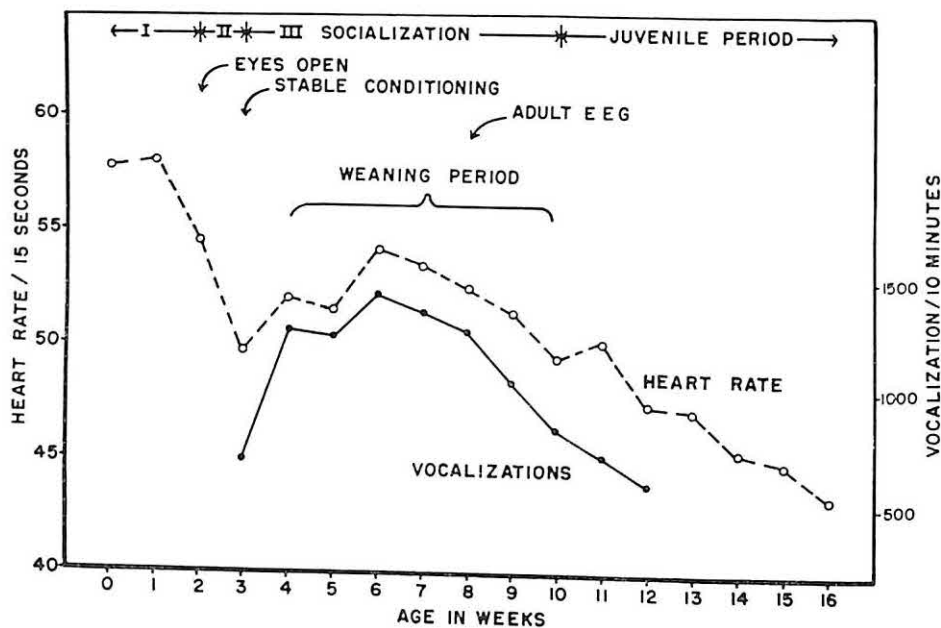


FIGURE 2
VOCALIZATION IN RELATION TO HEART RATE. THE HEART RATES REPRESENT THE AVERAGES FOR 60 BEAGLE PUPPIES IN ANOTHER STUDY

of one beagle, we offer them more to point out a possibly meaningful line of investigation than as data definitely conclusive of any developmental change.

Figure 2 compares changes in vocalization in the three weeks group with

changes in heart rate of 60 beagles in another study (18). The vocalization curves appear to follow the general trend of heart rate changes, which were measured in an entirely different set of pups, though from the same genetic strain as the beagles in the present experiment. Though there were no data available in vocalizations in the situations presented in this experiment for pups before three weeks of age, vocalization of puppies while weighed showed a downward trend similar to that of the heart rates from birth to three weeks of age (18). Whether or not there is a direct relationship between the physiological and behavioral measurements and the weaning period, it appears that this is a time when the chance of emotional distress for developing puppies is relatively increased.

The data we gathered on the cocker spaniel and wire-haired fox terrier puppies showed the same general trends as the beagles, with the cockers showing a tendency for less vocalization than the beagles and the terriers showing more yelping up to eight weeks of age, with a precipitous drop afterwards. This indicates that there are probably breed differences in amount of vocalization to a distress-arousing situation, but we do not yet have sufficient numbers to make a valid breed comparison.

2. *Patterns of Vocalization*

All the test sessions had been recorded on tape. This permitted us to play back each session and obtain an accurate count of the number of vocalizations per minute. Figures 3 and 4 show that the initial minute of a test period at any age is not at all representative of the ten-minute session as a whole. This supports Fredericson's (8) findings with "distributed versus massed experience," and in part explains his findings.

The pattern of vocalization at three weeks of age is unique in that the number of yelps rises and then declines. The drop in vocalizations was probably due to fatigue. Slightly older puppies become increasingly disturbed throughout the ten-minute period.

The curve that occurs at four weeks persists in this pattern through six weeks of age, then begins to reverse itself at seven weeks until by nine weeks it is horizontal in trend. By 12 weeks of age (Figure 4) we find that a complete reversal has taken place. The vocalizations now are high at the beginning of the ten-minute period and gradually decrease throughout the session.

When an animal is exposed to a stressful situation for the first time it shows an initial low number of vocalizations which steadily increase in number and volume throughout the 10-minute period. This is especially

true of those groups which were introduced into the experiment at the nine and 12 weeks levels. The behavior which accompanies this acceleration of vocalization will be dealt with later.

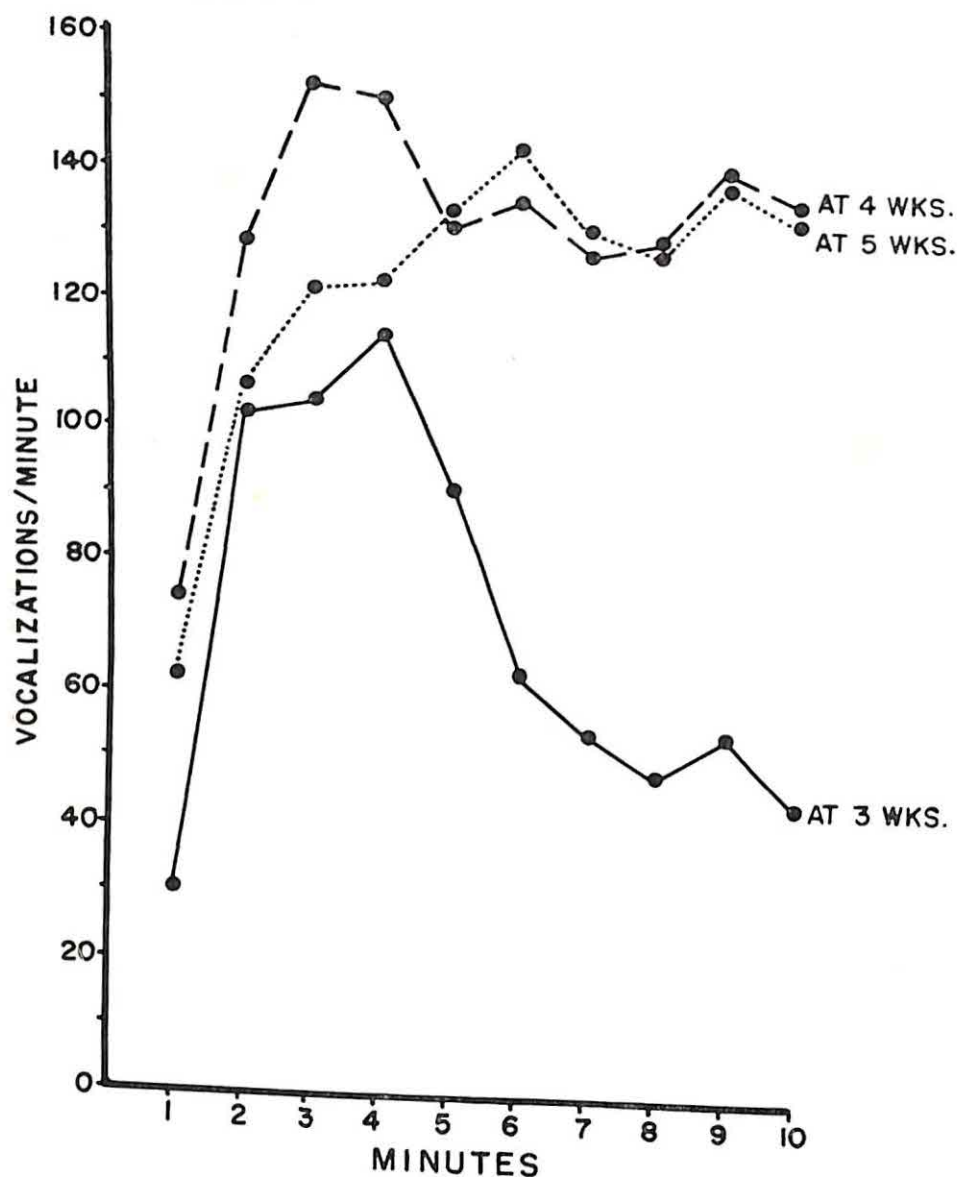


FIGURE 3
PATTERN OF VOCALIZATION AT SUCCESSIVE WEEKS, FOR GROUP STARTED AT THREE WEEKS.
THE PEAK RATE OF VOCALIZATION, INDICATING EMOTIONAL DISTURBANCE,
IS REACHED AFTER THREE OR FOUR MINUTES

An interesting feature is that the three weeks and six weeks groups show similar curves at six weeks of age but differentiate strongly afterwards, with the six weeks group lagging behind as regards the reversal process. At 12

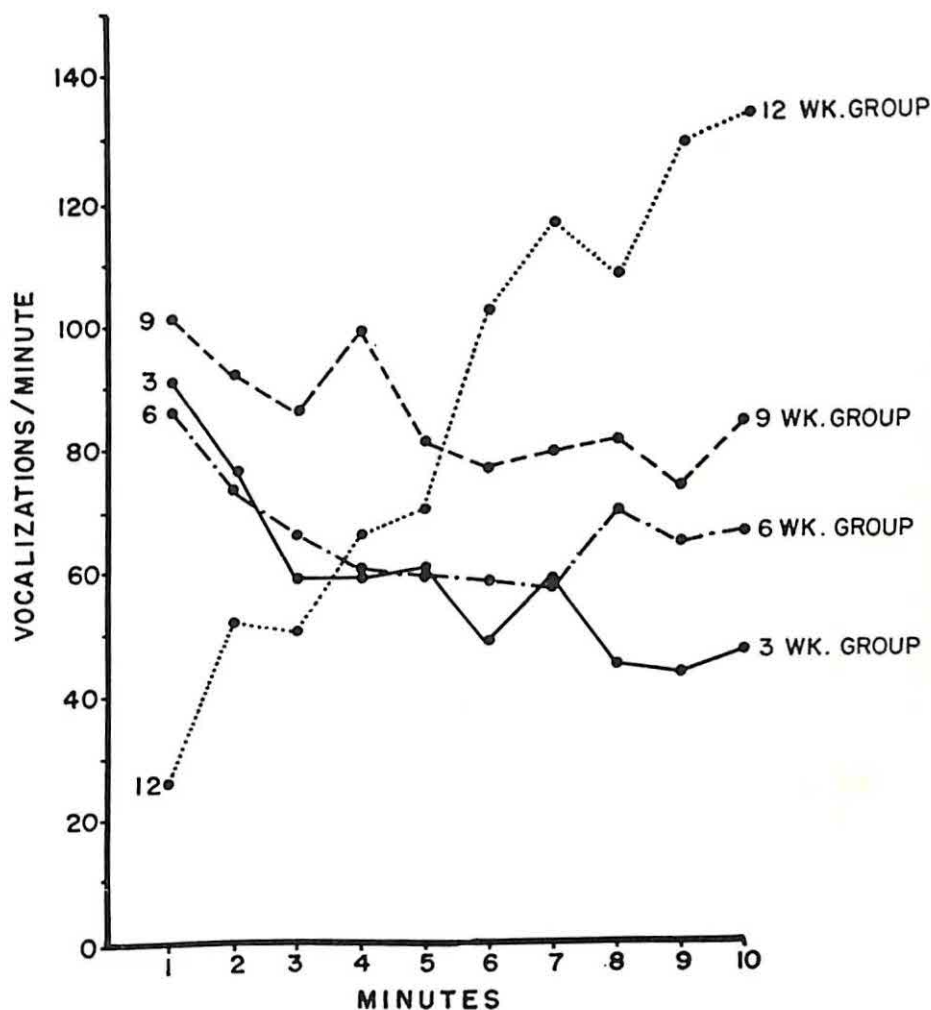


FIGURE 4

PATTERNS OF VOCALIZATION IN A STRANGE PEN AT 12 WEEKS OF AGE. NOTE THE VERY DIFFERENT PATTERN OF THE 12-WEEK GROUP, WHICH IS EXPERIENCING THE SITUATION FOR THE FIRST TIME

weeks of age (Figure 4), the four groups of beagles show curves unique to each group, indicating a strong effect of experience.

Data are shown in Figures 3 and 4 for the strange pen only, since the patterns of vocalization were similar in the home pen.

To make it possible to conveniently do a statistical analysis on the changes in vocalization during the 10-minute period, we subtracted the sum of the last two minutes from the sum of the first two minutes and studied these scores in a series of analyses of variance (Table 2). "Weeks at which tested" was uniformly high in statistical effect. Since both the strange pen and the home pen showed identical vocalization patterns within the ten-minute period, there was little effect of "rooms in which tested" as such. There is an increasing effect of groups until the difference introduced by the 12 weeks group (Table 2) is so strong as to make the deviations of the linear regression of the groups statistically significant.

TABLE 2
ANALYSIS OF VARIANCE OF VOCALIZATIONS CHANGES DURING TEN MINUTE PERIODS
FOR BEAGLES AT TWELVE WEEKS ON GROUPS STARTED AT THREE,
SIX, NINE, AND TWELVE WEEKS

Source of variation	Sum of squares	df	Estimate of variation	F	Level of sig.
Groups	319,181.5	3	106,393.8	16.43	<.01
Groups $\times$ subjects (ss within groups)	181,305.5	28	6,475.2		
Rooms	8,883.1	1	8,883.1	1.28	—
Rooms $\times$ groups	88,261.2	3	29,420.4	4.24	<.05
Rooms $\times$ subjects	194,501.9	28	6,946.5		
		63			
		(N-1)			
Regressions	258,223.5	1	258,223.5	39.88	<.01
Deviations	60,958.0	2	30,479.0	4.71	<.05
error	181,305.5	28	6,475.2		

This analysis shows that the pattern of vocalization changes with age. Puppies from four to six weeks of age become increasingly disturbed during isolation, while older puppies apparently become less disturbed following the first experience. Puppies of any age become increasingly disturbed during the first trial.

The terrier and cocker spaniel puppies show patterns of vocalization over the 10-minute periods similar to the beagles.

3. Activity

At the beginning of the last 15 seconds of each minute the observer recorded whether or not the puppy was active at that instant. Activity while

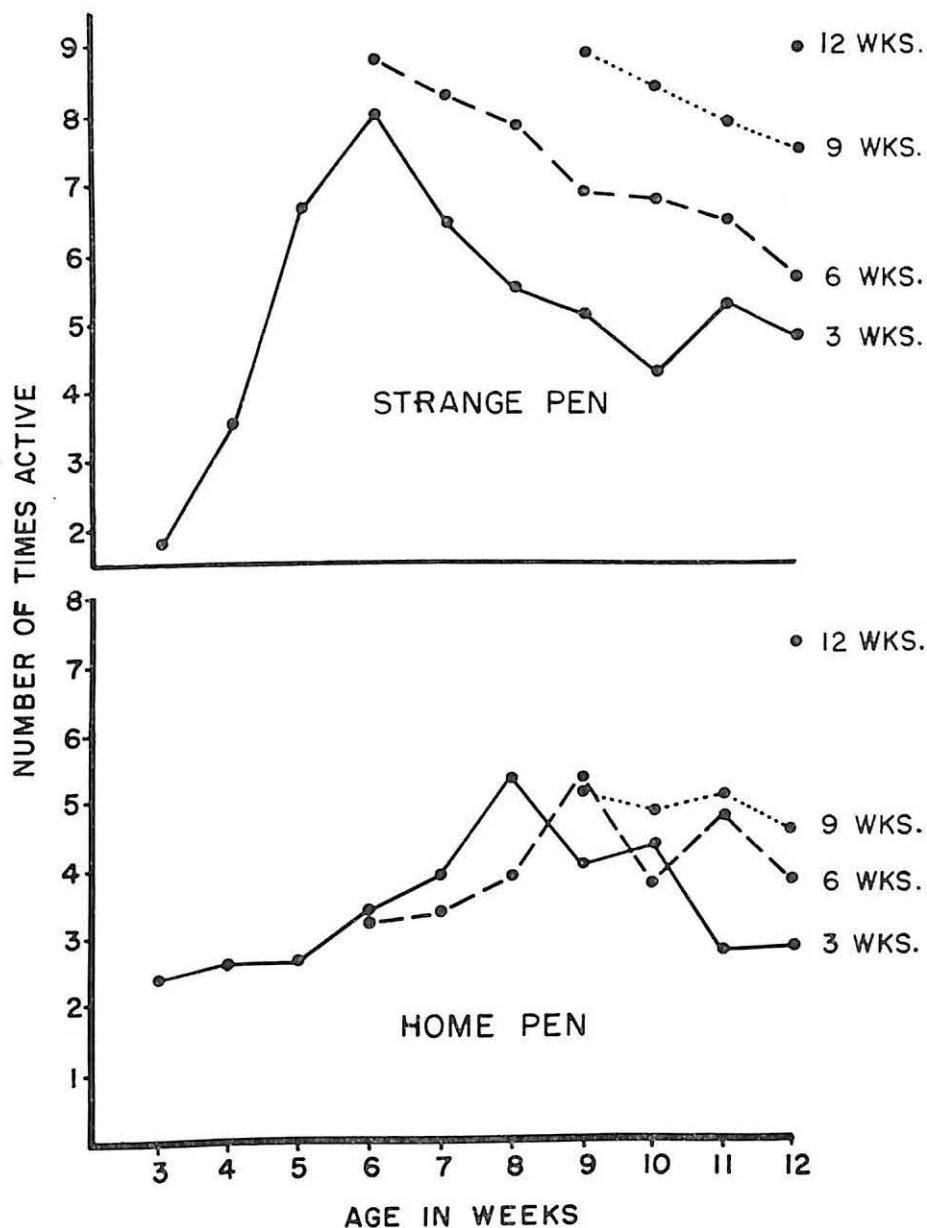


FIGURE 5
ACTIVITY SCORES AT DIFFERENT AGES. NOTE THAT THE CURVE OF ACTIVITY
IN THE STRANGE PEN IS SIMILAR TO THE CURVE
OF VOCALIZATION (FIGURE 1)

isolated appears to vary according to "room in which tested," "Weeks of age," and "groups tested," as shown in Figure 5. It is evident that the six weeks, nine weeks, and 12 weeks groups are uniformly very high in activity in their initial trials. These activity scores are also representative of the total activity throughout the total 10-minute period.

The activity scores were examined by a series of analyses of variance, which indicated that activity in the strange pen was significantly greater than in the home pen, that "weeks of age when tested" had an important effect, and that the groups were significantly different in activity. At 12 weeks the difference among the four groups was statistically significant with most of the difference due to linear regression. When tested in the strange pen the groups are significantly different statistically (by use of the Mann-Whitney U Test) throughout the testing with two exceptions: at six and 12 weeks of age the three weeks and six weeks groups were not significantly different.

The activity curves for the strange pen could be compared with the total vocalization and heart rate curves of Figure 2 to further indicate important developmental features taking place during this "critical period." It is apparent that activity as well as vocalization is part of the pattern of the distress reaction shown by puppies in an anxiety producing situation.

4. *Urination and Defecation as Measures of Emotionality*

C. S. Hall (13) states that in rats "emotional defecation and urination are valid measures of individual differences in emotionality." He found a decrease in elimination as rats became used to the field situation.

Significant differences were found in total number of defecations and urinations occurring in the strange pen versus the home pen with puppies in the present experiment (Table 3). The beagles defecated and urinated more in the strange pen than in the home pen at the .001 level of significance, as analyzed by the McNemar Test for the Significance of Changes. Urinations analyzed separately were likewise significantly different at the .001 level. Defecations, by themselves, though higher in the strange pen in comparison to the home pen, were not statistically different.

There were no apparent effects of maturation, habituation, or groups noticed in the elimination patterns of the puppies in the present experiment. Among the difficulties involved in using a measurement of this type for dogs are the large differences in habits of elimination between dogs and rats, both in frequency and in the form of the feces. The feces pellets of rats can be readily counted as units, while dogs usually defecate only once in a

test situation. Urination in dogs may occur more frequently, but seldom occurred more than once in our testing sessions. The use of elimination as an emotional index in dogs appears to be limited as anything but a gross measurement.

TABLE 3
TOTAL NUMBER OF URINATIONS AND DEFECATIONS

Groups	Strange pen	Home pen
3 Weeks	80	39
6 Weeks	83	44
9 Weeks	38	18
12 Weeks	10	7

5. *Overt Behavior Accompanying Vocalization*

The minute-by-minute trends in vocalization as analyzed previously are reflected in other forms of behavior. When a 12-week-old pup was put in the strange pen for the first time, it would freeze, usually in a crouching position where first placed in the center of the room. Next the pup would move about cautiously, then suddenly freeze with paw in air, even though no outside noise had apparently (to human ears) occurred. During this guarded, cautious period the puppy usually made short, sharp barking and whining sounds. Usually after the second minute the puppy started to sniff excitedly around in the center and work toward the periphery of the room, vocalizing more steadily. He would then pace about the room, staying close to the walls, and soon he was running faster and faster around the room, bounding off of the walls, pawing, scratching and climbing. At the same time, vocalization was accelerating in frequency and volume. At the height of his emotion the puppy's vocalizations were characterized by sounds indicative to human ears of highly painful sensations. At this time vocalization appeared to demand involvement of the whole body, which would contort with every utterance, in contrast to the calm aspect of the body during the merely complaining sort of bark.

Fredericson (10) has investigated the wall seeking tendency in mice, which he says is "elicited by open spaces." He found that three different strains of mice all exhibit a pronounced tendency to follow along the walls of the field and to stay away from the center when placed in an empty box.

In the present study we found that attraction to walls per se was almost nonexistent in the home pen, which had several items of furniture present; however, in the empty strange pen a great deal of wall seeking behavior was evident. In the home pen the puppy would have a tendency to stay

more towards the center of the room and orient to various objects present in the situation. In the strange pen the puppy usually trotted around the walls, seeming to follow a definite path, and would stand or sit next to a wall when not active. In the more excited sessions the puppy, when left in the center of the room at the beginning of the period, would dash out to the periphery of the room and race around the walls, leaping, climbing and scratching the walls, the door and the partition. This behavior probably represents an attempt to escape rather than true wall seeking.

The eating and drinking behavior of the beagles in their home pen was very random and sporadic throughout the testing. The cocker spaniels present a similar picture. The wire-haired fox terriers, however, ate and drank more than either, and did this consistently throughout the testing.

The highly active running about, leaping, climbing and scratching did not appear until after six weeks of age. At the early ages the pups have a consistently high tendency to go into the house, sit or lie down, and eventually sleep there. As they get older they do this in front of or near the house and later on climb the ramp, lie down and occasionally sleep in this spot. There is some tendency to lie down even in the strange pen, but for the beagles and wire-haired fox terriers this disappears after five weeks. In the home pen the sleeping behavior as well as the pen seeking behavior decreases sharply for the beagles after six weeks. The cocker spaniels apparently established this behavior as a satisfying escape mechanism, since they would lie down in the strange pen, even in the last sessions, and would lie down and sleep in their home pen throughout the testing. This, however, may be a strictly biological phenomenon.

6. *Reaction to Human Handlers*

Table 4 shows mean scores for the four groups in the test of social reaction to standardized human handling. The differences shown in Et-epimeletic and Investigative Behavior and in Total Attraction between the 12 week group and the other groups were not statistically significant.

The four groups in this experiment were compared with a group of 55 beagles from the same colony which had received standardized human handling in a program of tests designed to investigate the relationship of genetics to behavior (20).

All four groups were significantly higher in Avoidance scores ($< .05$, Mann-Whitney U Test) than the 55 program beagles. In Total Attraction the program beagles were much higher than the four groups ($< .01$). In the Et-epimeletic Investigative category the three week group was lower

than the program dogs at the .05 level of significance; while the six week, nine week, and 12 week groups were lower at the .01 level of significance. The Et-epimeletic investigative category is one of the Attraction type scores included in the Total Attraction category.

TABLE 4
MEAN HANDLING TEST SCORES—AT THIRTEEN WEEKS OF AGE

Group	Avoidance	Et-epimeletic & investigative	Total attraction
3 Weeks	36.9	40.8	61.1
6 Weeks	34.3	37.8	62.5
9 Weeks	27.3	39.1	65.0
12 Weeks	33.6	27.0	43.4
Program beagles (N-55)	21.8	57.8	96.1

The greater timidity and lower attraction of the beagles in this experiment is undoubtedly due to the fact that they received a limited amount of socialization in the process of being transported to and from the testing situation, in comparison to the richer experiences of the program beagles (20).

A Pearson product-moment correlation coefficient was run on the pups in this experiment between scores on the Handling Test and total number of vocalizations. The correlation between vocalizations and Et-epimeletic Investigative Reactions was — .356 (significant at $< .05$), while that between vocalizations and Total Attraction was — .331. This indicates that the more the puppy yelped the less friendly he would be toward a human handler. This probably reflects a genetic trait. There was an insignificant correlation of .096 between vocalizations and Avoidance scores.

D. DISCUSSION

1. *The Relation of the Experiment to Previous Experimental Work*

Vocalizations of various types play a meaningful role in the behavior of animals (19). For example, they may serve both to hold a group together and to indicate territoriality among birds and howling monkeys, as well as signals for care and attention. Several studies have also been undertaken to examine the particular problem of the relationship of vocalization to distress and anxiety.

Fredericson (9) utilized vocalization of puppies to investigate the concept of "perceptual homeostasis." He postulated that puppies in response to an emotionally upsetting experience use vocal expression to establish psycho-

logical equilibrium. Important here is his implication that this re-establishment of equilibrium is anticipatory rather than actual. As some of the results in the present experiment have suggested, this behavior may cause emotional states opposite to those which the puppy was attempting to achieve.

Fredericson (9) found that pups confined with another puppy vocalized significantly less than when they were confined alone or with a small box. The isolation factor, therefore, is of paramount importance. He also found (8) that puppies vocalize more and are more active when confined in isolation for a massed 10-minute period than in distributed trials of one minute confinement followed by one minute periods of freedom of movement for a total of 10 minutes in confinement. Here again the results of the present experiment indicate how the initial minute of testing is not at all representative of the 10-minute period as a whole and varies in relationship to age and habituation factors.

Ross, Scott, Cherner, and Denenberg (16) tested cocker spaniel and hybrid puppies at four weeks of age and found that puppies kept in their home pens vocalize more when restricted than when non-restricted, and more alone than when together. Vocalization decreased both within a 10-minute period and between periods repeated over a 10-day interval.

Causey (5) found that a bone decreased the number of vocalizations more than the presence of the mother or a litter mate. Isolation in a strange pen caused more vocalization, more activity, and more defecation and urination than did isolation in the home pen. Throughout the period from three to 12 weeks the number of vocalizations increased to a peak at seven weeks of age in the strange pen and at eight weeks in the home pen and then decreased to the last test at 12 weeks.

In general, the curves shown by the beagles in the present experiment are similar to those in Causey's (5) small sample, with our beagles showing a somewhat higher peak for the strange pen. The vocalization rates of Fredericson's (9) dogs when confined alone and when confined with a small box at eight and nine weeks of age are highly similar to the vocalizations given by our beagles in the home pen at these ages. We must bear in mind that Fredericson used a highly variable group of hybrid and purebred dogs, none of which had any beagle background.

Early in the life of human infants, causes of crying tend to be physical while emotional factors are important later on. In the second half of the first year of life fear of a strange situation and dislike of unusual handling are strong releasers of crying behavior. Crying of this sort begins at three months and gradually increases throughout most of the first year (1).

Levy (15) found that crying and other resistance of human children to examination on the physician's table was almost non-existent during the first six months, but rose to more than 80 per cent between 18 and 29 months, declining thereafter. The curve is similar to that of the yelping of puppies and may represent the action of similar maturational factors.

In the culturally conditioned adolescent and adult human being the expression of anxiety and distress may take the form of verbal rather than emotional vocalization. Benton, Hartman and Sarason (2) found that "high anxious" human subjects (as determined by the Taylor Scale of Manifest Anxiety) were higher than "low anxious" subjects in total word count at the .06 level of significance.

The fear or dislike of isolation is a factor which is often consciously recognized in human society. One of the present authors administered a questionnaire to 74 high school seniors, asking them to fill in answers to such open-ended questions as "I'm most unhappy when _____." To this, 31 (42 per cent) of the subjects of the sample responded that they were most unhappy when they were alone (6).

2. *The Significance of the Results of the Present Experiment*

Is the behavior of puppies maladaptive in the sense that they go on yelping even when yelping never results in their release from the uncomfortable situation? According to Fuller's (12) situational analysis and Scott's (17) 3-factor theory, abnormal behavior should result from a situation in which motivation is very high, adaptation is impossible, and escape is likewise impossible. This fits the experimental situation used here, except that the time period is so short that one would not expect serious symptoms to develop. Furthermore, distress vocalization is a normal adaptive reaction for young puppies in such a situation. If the puppy yelps long enough, something usually happens.

Does yelping help the puppy adapt to unpleasant sensations by a process of catharsis? The pattern of yelping in older puppies after repeated separations indicates that this might be so. However, the first experience indicates that yelping actually increases from minute to minute during the 10-minute period.

The behavior of suddenly acting afraid appears to be in itself frightening to the puppy and causes him to become even more emotionally distressed, a process of self-facilitation.

Black (3) found that the use of stimulus words and questions played to human subjects through earphones caused these subjects to respond with an identical intensity to that of the stimulus. Even when the subjects were in-

structed to answer at a different intensity than the stimulus, they still persisted in the tendency to follow the intensity of the stimulus. Though we do not have data as yet on similar experimentation with puppies, the vocalization behavior in this study indicates that an increase in yelping intensity and rate by a puppy may exert an influence on his subsequent vocalization level (Figure 3).

Thus, expression of a particular type of emotion may increase the emotion itself. The pup is disturbed, yelps, and paces about. By yelping (and thus hearing himself yelp) he becomes more disturbed. Thus yelping frightens him, causing him to yelp more, and be more active, nervous and excited.

It is therefore possible that expression of an emotion may help to create the emotion rather than eliminate it. Despite psychoanalytical and psychodramatic theory, catharsis may not "empty out" or "purge" anxiety but accentuate it. When a latent force is made manifest it is not necessarily readily disposed of. One of the premises of "Morita therapy" is that complaint and discussion of symptoms only aggravates them (14).

The testing procedure had a low socialization value, as was shown by the uniformly low scores in friendliness to humans in the Handling Test. It would be interesting to investigate whether puppies that had been played with would respond more or less emotionally when isolated.

Amounts of vocalization and activity appear to be directly related to the factor of isolation in a strange pen versus isolation in the home pen, and also to influences exerted by the "critical period." Thus, the strongest expression of the distress reactions of the puppies when isolated in the strange pen appeared at six weeks and seven weeks in vocalization and at six weeks in activity. This appears to be related to maturational changes taking place in young dogs, and perhaps to stress accompanying weaning. Freedman, Elliot and King (11) found a mounting time lag in positive response of puppies (during this period of time) to a passive human handler, if the puppies had no previous contact with people.

Vocalization in dogs appears to be a good indicator of emotionality and is apparently elicited by the stimulus of isolation as well as restraint if these conditions are applied under normal conditions of rearing. Fisher (7) found that vocalization does not appear in puppies isolated and restrained in a small pen if these conditions were established at 18 days, just before the critical period.

The results of the present experiment indicate that the interaction of strangeness and isolation is more important than the factor of isolation *per se*, in releasing distress reactions which have also been influenced by devel-

opmental changes. This conclusion suggests that the occurrence of acute crying and fretting in human infants observed in day nurseries and hospitals (4) may have more complex causes than simple separation from the mother. Such human infants are likewise on strange ground, and in addition may be ill and subjected to painful treatment.

E. SUMMARY

Thirty-two purebred beagle puppies were isolated for 10-minute periods in their home pens and in a strange pen at weekly intervals from 3 to 12 weeks of age, in order to study the effect these situations would have upon their distress reactions as measured by vocalization and activity. The beagles were randomly assigned to four groups of eight each, one group of which was tested from 3 to 12 weeks, another from 6 to 12 weeks inclusive, a third group from 9 to 12 weeks, and a fourth group tested only at 12 weeks of age.

The puppies showed greater distress reactions (in both vocalization and activity) when isolated in a strange pen than when isolated in the home pen. In the strange pen the maximum disturbance was elicited at six to seven weeks; in the home pen this occurred at three weeks. The distress reactions were apparently greatly influenced by maturational changes taking place during the "critical period" and later in development. Relatively little effect was produced by habituation.

Patterns of vocalization within the 10-minute test periods changed in ways that reflected the influence of the "critical period" and also of familiarity with the situation. These patterns suggested that the vocalization of puppies unfamiliar with a distressing situation may serve as a self stimulation and result in an increase of distress rather than a "catharsis."

The number of defecations and urinations were found to be significant in this experiment as indexes of emotionality. However, their use in puppies is limited by the fact that this behavior is seldom repeated in one test trial. Elimination in dogs does not show the wide scale of response seen in rats.

The data provide a baseline for emotional reactions of young puppies, indicating that the most severe emotional reaction produced by brief separation in a strange place occurs at six to seven weeks of age, near the end of the critical period for primary socialization and just before the period of final weaning to solid food.

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CHANGES IN MEANING AS A FUNCTION OF AGE*

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A. CLASSIFICATION

Using the classical conditioning technique, Riess (1946) has demonstrated progressive changes in the locus of maximal generalization with increasing age of Ss. The galvanic skin response was conditioned to a meaningful word and the extent of generalization to homophones, antonyms, and synonyms was noted. Eight-year-old Ss responded with greatest amplitude to homophones (primary stimulus generalization), while 14- and 18-year-old Ss were relatively more responsive to synonyms (secondary or mediated generalization). The attempt to subsume the acquisition of meaning under the conditioning paradigm has received further support from studies conducted by Staats and Staats (1957) and Staats, Staats, Heard, and Nims (1959). The semantic differential (Osgood, Suci, & Tannenbaum, 1957), a multidimensional rating scale, was employed as the index of meaning. Nonsense words (CS) were paired with meaningful words (UCS) for varying numbers of trials. The degree to which the CS took on the meaning (UCR) of the UCS was found to increase with the number of pairings. This finding was substantiated for all three of the semantic differential factors (evaluation, potency, and activity).

The present study was concerned with the variation in the meaning of concepts as a function of age. Since the number of pairings between signs and the objects which they signify increases with age, systematic changes should occur as a function of the age of the subject. The change should be in the direction of a decreasing disparity between the meaning of a concept and the normative adult meaning.

Factor analyses of the semantic differential have consistently yielded evaluation (good-bad), potency (strong-weak), and activity (active-passive) as three important aspects of meaning. Evaluation has accounted for approximately one half of the common variance, while the remaining portion has been equally associated with potency and activity. Assuming that the proportion of variance associated with a factor reflects the frequency of discriminations relevant to that dimension, it was predicted that evaluative

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meaning should reach asymptotic values at an earlier age than the potency and activity factors. In order to contrast primary with secondary generalization, signs at two levels of abstraction (pictures and words) were used. The expectation was that pictorial signs would acquire stable meanings earlier than would verbal signs.

B. METHOD

1. Subjects

Two hundred Ss, 50 at each of four age levels, were used in the study. The Ss were selected from the first, third, and sixth grades of the same grammar school and from university students enrolled in introductory psychology. The mean age of these groups was 6.94, 8.96, 11.96, and 22.40 years respectively.

2. Experimental Materials

In order to test for differences in meaning as a function of the abstraction level of the sign, one picture and one word were chosen to represent each of ten stimulus-objects. The 10 pictures were chosen from a larger group of black line drawings on the basis of familiarity and representativeness. Ultimately, the following test signs were adopted: lion, flower, fish, pony, leaf, butterfly, frog, squirrel, and chicken. Because pilot work indicated that children could not discriminate reliably on the conventional seven-step form of the semantic differential, five-step scales were used. A dual criterion was employed in selecting the scales; namely, high frequency in the language of the words used to define the scales (Thorndike & Lorge, 1952) and high factor loadings of the scales (Osgood *et al.*, 1957). The scales selected were: *good—bad*, *kind—cruel*, and *happy—sad* for the evaluative factor; *large—small*, *heavy—light*, and *strong—weak* for the potency factor; and *hot—cold*, *fast—slow*, and *sharp—dull* for the activity factor.

3. Procedure

Because of the inability of the youngest group to check the scale positions in the usual rating scale format, the scale positions were verbalized as a series of alternatives. The children were tested individually and first asked to decide whether the sign was adequately described by either scale endpoint or neither. If the response was "neither," then the examiner proceeded to the next scale. If one of the endpoints was selected, the S was forced to choose between the unmodified endpoint or the endpoint preceded by the modifier "very" (e.g., "good" or "very good"). The remaining age levels were

tested by a group technique in which the sign was presented on a screen by means of an opaque projector. The third, sixth, and university students were given a short period of instruction in using the rating scale. For the third grade students alone, the scale positions were verbalized at each presentation. It was observed that, for the majority of Ss, this aid was not required. One half of the Ss at each age level received pictures to rate, the other half received words. Each sign was rated on all nine scales of the semantic differential. In order to have an estimate of the initial rating behavior of the two subgroups within each age level, all Ss rated one word (dog) and one picture (rabbit) in common.

C. RESULTS

The extent of agreement on the ratings of the common stimuli (dog and rabbit) are presented in Table 1. These correlations were obtained by summing across the Ss with respect to scales and correlating the resulting values between subgroups at each level. All correlations were significantly different from zero at the .05 level, indicating a substantial degree of similarity.

TABLE 1
SIMILARITY OF RATINGS BETWEEN SUBGROUPS AT EACH AGE

	Age			
	7	9	12	22
Word (dog)	.87	.97	.69	.70
Picture (rabbit)	.98	.90	.96	.98

The ratings of the test stimuli were evaluated by analysis of variance. Each cell entry was the sum of the rating of ten concepts on the three scales for each semantic differential factor. The summary of the analysis is presented in Table 2. The test stimuli, as a whole, were seen as somewhat high in evaluation (3.38), low in potency (2.65), and high in activity (3.28). The main effect of age was significant (p of less than .001), but, of greater interest, was the relative change in the three aspects of meaning. The significant age level by semantic factors interaction (p of less than .001) reflects the varying age at which asymptote was reached. As shown in Figure 1, concepts were perceived as progressively lower in evaluation and potency (i.e., toward the bad and weak ends of the continuum). The evaluative factor stabilized at age nine, whereas potency stabilized at age twelve. Thus, as predicted, the first two dimensions unfolded in the order of the variance associated with them in factor analytic studies. The activity factor, however, failed to show any consistent trend within the ages sampled.

The abstraction level of the sign did not appreciably affect the ratings as neither the main effect nor any of the first order interactions involving this variable were significant. Only the second order interaction with age levels and semantic factors attained significance (p of less than .05). Although it

TABLE 2
ANALYSIS OF VARIANCE OF SEMANTIC DIFFERENTIAL RATINGS

Source	df	ms	F
Between Ss	199		
Age level (A)	3	1,965.36	12.81**
Abstraction level (L)	1	151.00	—
A $\times$ L	3	81.83	—
between Ss same group	192	153.39	
Within Ss	400		
Semantic factors (F)	2	28,008.94	39.59**
A $\times$ F	6	880.84	12.45**
L $\times$ F	2	156.46	2.21
A $\times$ L $\times$ F	6	263.43	3.72*
pooled Ss $\times$ F	384	70.73	
Total	599		

** p of less than .001.

* p of less than .05.

was difficult to interpret this latter finding, an examination of the graph of the interaction revealed that evaluative meaning tended to be more intense for pictorial rather than verbal signs at the youngest age studied, while differences in abstraction level led to no such effect on the other two semantic factors.

D. DISCUSSION

The finding that evaluation asymptotes at an earlier age than potency lends some support to the contention that the proportion of common variance associated with a factor is an index of the frequency of discriminations along that dimension. Thus, since evaluation discriminations receive considerable differential reinforcement, they stabilize first. The fact that the activity dimension did not vary appreciably over the age range from seven to 22 years is inexplicable within the framework of the present experiment. In view of the confirmation of the hypothesis concerning the evaluative and potency factors, it may simply mean that the concepts chosen were an unfortunate selection with respect to the activity dimension.

The lack of variation in meaning as a function of the abstraction level of the sign is puzzling. According to the mediated conditioning view, meaning is a response resulting from internal stimulation produced by implicit responses to signs. Signs which have stimulus properties similar to those of

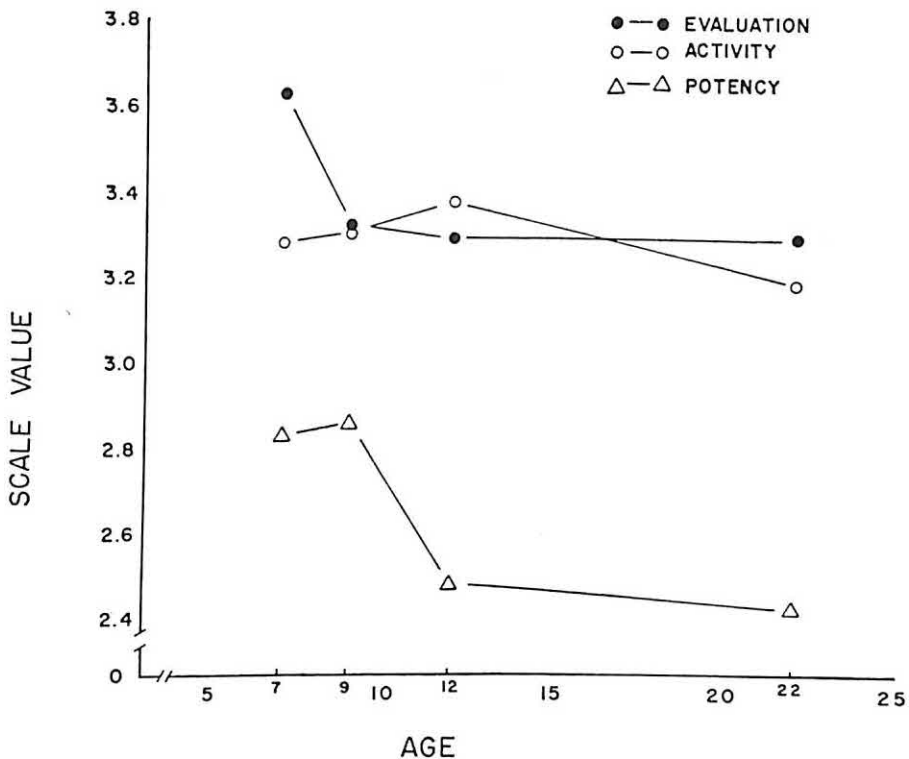


FIGURE 1
CHANGES IN SEMANTIC RATINGS AS A FUNCTION OF AGE

the object signified should acquire the meaning response at a more rapid rate than sign devoid of such similarity. Only the evaluative dimension gave any evidence of confirming this contention. The selection of pictures as representative of signs having properties in common with the stimulus object was based upon the assumption that pictures elicit the same mediating responses as do verbal signs. This may have been an unfortunate assumption as a conditioning study by Keller (1943) indicated that a GSR conditioned to a *picture* of a boy scout hat generalized to a *picture* of a fireman's hat, but not to the word "hat." This would indicate the lack of a common mediator.

E. SUMMARY

The same concepts, each represented by both a picture and a word, were rated on the semantic differential by Ss of seven, nine, 12, and 22 years of age. Evaluative meaning remained unchanged after nine years, potency after 12 years, and activity showed no change over the ages sampled. The abstraction level of the sign (picture or word) made essentially no difference in the rating behavior of the Ss. The results were interpreted in terms of a mediated conditioning theory of meaning.

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A COMPARISON OF THE PATTERNED AND NON-
PATTERNED PROBABILITY LEARNING OF
ADOLESCENT AND EARLY GRADE
SCHOOL-AGE CHILDREN*

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A. INTRODUCTION

Brunswik (3, 4) has argued convincingly that research on human learning should be as representative of everyday life as possible. He has pointed out that classical learning studies employing 100 per cent reward or 100 per cent punishment of responses do not represent natural learning situations where partial reinforcement is the rule, not the exception, and where most events occur with some probability of less than one. In recent years, following Brunswik's suggestion, a growing body of research on probability learning and decision-making has eventuated. In the main, these studies have employed either animals or college students as subjects (1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15). With a few notable exceptions (16, 17, 18), studies of children's probability learning and decision-making have yet to be conducted. Research of this nature is necessary for several reasons. First, research with children will provide information for comparative psychology by ascertaining similarities and differences between the probability-learning capacities and processes of children and those of adults, on the one hand, and between those of children and subhuman organisms, on the other. Second, research in this area should contribute to genetic psychology by determining changes with age in children's probability learning processes and abilities. Third, research regarding children's probability learning may ultimately provide valuable information regarding basic learning mechanisms underlying children's early social learning and personality development. For example, the social learning of children characteristically takes place in a probabilistic environment. Few, if any, parents are invariably consistent in the reinforcement of their children's social behaviors. Nor are their own behaviors, as potential learning models for their children, invariant. Also, as young children begin to interact with persons outside the home and primary group, they find themselves confronted with additional

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inconsistencies and irregularities from person-to-person and from situation-to-situation. In short, if children's social learning were solely dependent on the rare occasions of consistent 100 per cent reinforcement, as employed in classical experimental studies of learning, it is unlikely that very much socialization would transpire. Probability learning, then, appears to be a necessary and integral part of children's early social learning and personality development and should be studied, not only in its own right, but also as a potential influencer of more-complex social learning phenomena.

The present study was primarily concerned with one parameter of children's probability learning—age differences. Secondly, it explored possible differences in children's abilities to learn in patterned and non-patterned probability situations.

B. METHOD AND RESULTS

Forty children participated in the experiments. One group was comprised of twenty 15-, 16-, and 17-year-old adolescents; a second group contained twenty 6-, 7-, and 8-year-old children. All of the children came from middle-class socio-economic backgrounds and were above national averages in intellectual ability. The mean Stanford-Binet IQ of the older children was 124.8; that of the younger group, 118.6. The difference between the IQ's of the two groups of children was tested with Wilcoxon's test of unpaired replicates (19), and was not statistically significant.

1. *Experiment I*

This experiment was conducted in individual sessions. Each child was seated at a table facing an upright board on which were mounted two half-inch jewel lights, one red and one green. At right angles to this board and attached to it was a second board. A metal chute extended diagonally downward from this second board to a metal container in front of the child. The lights and the container were shown to the child and he was given the following instructions:

On the board in front of you are two lights, a red light and a green light. Today we want to see how well you can guess which one of the lights will flash when we ask you to guess. Each time before one of the lights goes on, I will say, "guess." Say "red" if you think the red light will flash; say "green" if you think it will be the green one. After you guess, one of the lights will flash. If your guess is right, a poker chip will slide down the chute into the container in front of you. If your guess is wrong, you won't win a chip. When we are all done, we'll count all the chips you have won and give you one cent for every

four chips. Since you will have a large number of chances to guess, you can win as much as seventy-five cents depending on how well you guess. Remember, each time you win a chip if your guess is right, but you won't win one if your guess is wrong.

The program of guessing trials was prearranged and the same for all children. Each child was presented an 80-20 probability learning situation for 80 trials in which, during each block of 10 trials, one light flashed on eight trials and the other light flashed on two trials. As a control for possible position and color preferences, the red (and left) light was employed as the more-frequently occurring stimulus for half of the younger and half of the older children, while the green (and right) light was the more frequent stimulus for the remaining children. The 80-20 probability learning situation was immediately followed by an 80-trial 50-50 probability condition. During this latter learning situation, each of the two lights flashed five times in each 10-trial block. Throughout the total series of learning trials, the temporal order of occurrence of the lights was non-patterned.

Each child's statements regarding which light he expected to flash on each trial were recorded. Expectations for the more frequently-occurring light were designated Ep , and constitute the basic data of the experiment. The mean of the Eps was tabulated for each block of 10 trials for both the 80-20 and 50-50 learning situations. Wilcoxon's non-parametric tests were applied to these data; the unpaired replicates test was used for between-group comparisons and the paired replicates test for within-group tests (19).

The learning curves of the two groups of children are presented in Figure 1. The probability learning of the older children appears superior during the 80-20 learning situation. This is evidenced in two ways. First, the older children's expectations for the more-frequent stimulus developed more rapidly during latter blocks of learning trials than those of the two younger children. Second, like adult Ss in previous two-event probability learning experiments, the mean expectation of these older children ultimately approximated the objective frequency of occurrence of the two stimuli while the mean expectation of the younger group of children did not. During the subsequent 50-50 probability learning period, the learning curves of the two groups of children were essentially the same. Statistical tests of the data produced the following results. (a) In previous two-event probability research, expectations for the two stimuli at the beginning of learning have been found to approximate 50-50. In the present experiment, however, during the first block of trials of the 80-20 probability condition, while the mean Ep of the younger children did approximate 50-50, that of the adolescent children did

not. Their mean Ep was less than .40, and significantly less than that of the younger children ($P < .01$). The writers have no ready explanation for

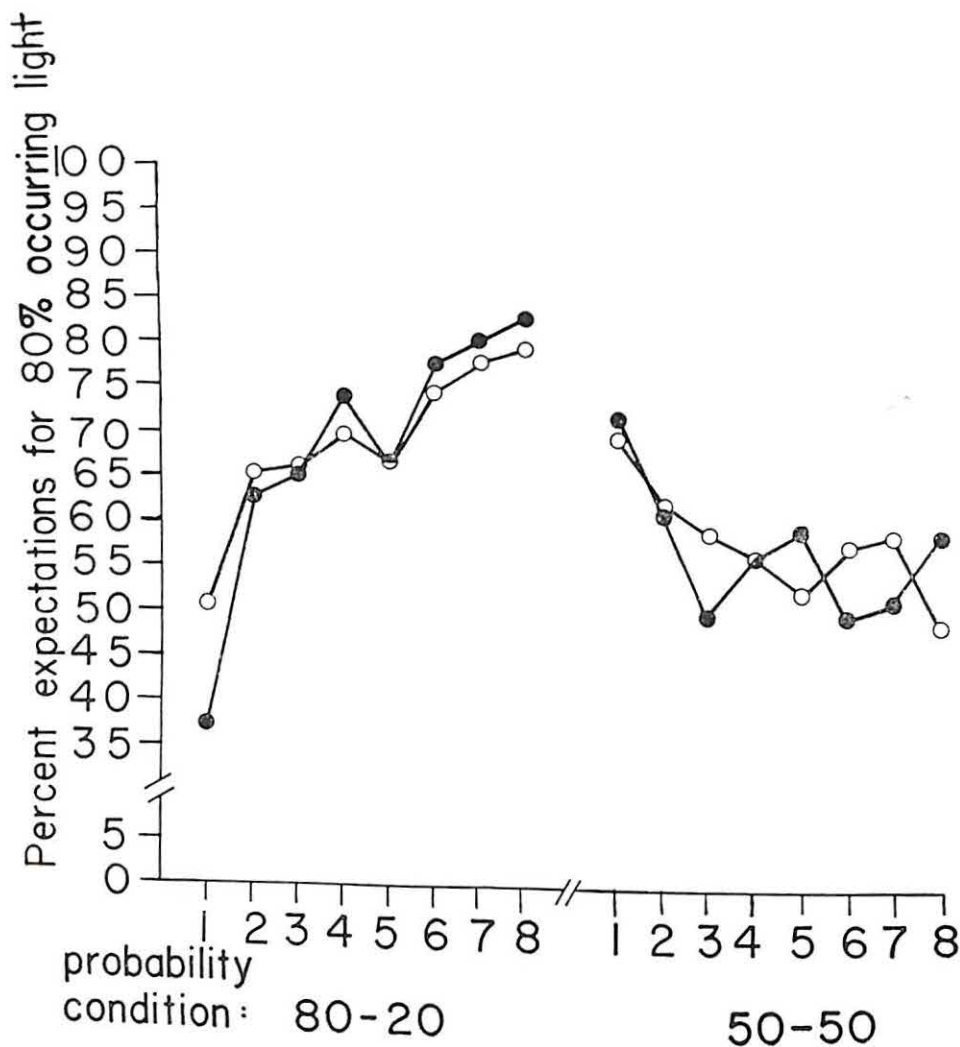


FIGURE 1

Percentage of expectations for the 80 per cent occurring light during 80-20 and 50-50 non-patterned probability learning plotted in 10-trial blocks. The open circles represent the learning curves of the younger children; the closed circles, those of the older children.

this phenomenon. (b) The Ep of both groups of children increased rapidly during subsequent trials; significant increases occurred for both groups between the first and second block of 80-20 learning trials ($P_s < .01$). (c)

While the initial rate of *Ep* development was similar for both groups, i.e., no statistically significant differences for the first six blocks of trials, the final *Ep* strength of the older children was greater than that of the younger children. The older children expected the more-frequent stimulus to occur more often during the seventh and eight blocks of trials than did the younger children ($P_s < .05$). (d) Finally, during the subsequent 50-50 probability learning situation no statistically significant differences were found between the expectations of the two groups of children. It should be noted that there was no significant difference in spite of the fact that the older group of children had previously developed stronger expectations for the occurrence of the more-frequent stimulus during the 80-20 conditions and, thus, had a greater shift to make in their expectations.

Immediately following the experiment, each child was interviewed regarding his guessing behavior during the experiment. One interesting point arose from these interviews: while the stimuli in the experiment were actually presented in a non-patterned sequence, a number of children reported that they expected, looked for, and (sometimes) thought they found the stimuli occurring in some consistent temporal pattern. These "higher-order" pattern expectations were reported by the adolescent children more frequently than by the younger children; 18 of the 20 adolescents said they had held pattern expectations while only six of the 20 younger children did so. It is, of course, possible that still others of the younger children may have employed such pattern expectations but did not, or could not, verbalize them. However, the interviews did suggest the possibility that the *process* of the children's probability learning, as well as the effectiveness of their learning, may have differed with age. A second experiment, employing patterned probabilities, was designed to provide information regarding this question.

2. Experiment II

The same children participated in the second experiment as in the original one, with an interval of approximately one year transpiring between the two experiments. The procedures of the two experiments were the same with one exception. In Experiment I the stimuli were presented in a non-patterned sequence; in the second experiment, consistent temporal patterns were employed. In the second experiment, during the 80-20 probability learning situation, the more-frequent light flashed on four successive trials followed by a single occurrence of the other light on the fifth trial. This 4-1, 4-1 pattern was maintained throughout the 80 trials of this condition. During the subsequent 50-50 probability condition, the more-frequently

occurring stimulus of the preceding 80-20 learning condition was presented five successive times and was followed by five successive presentations of the other light. This 5-5 pattern continued for the duration of the experiment.

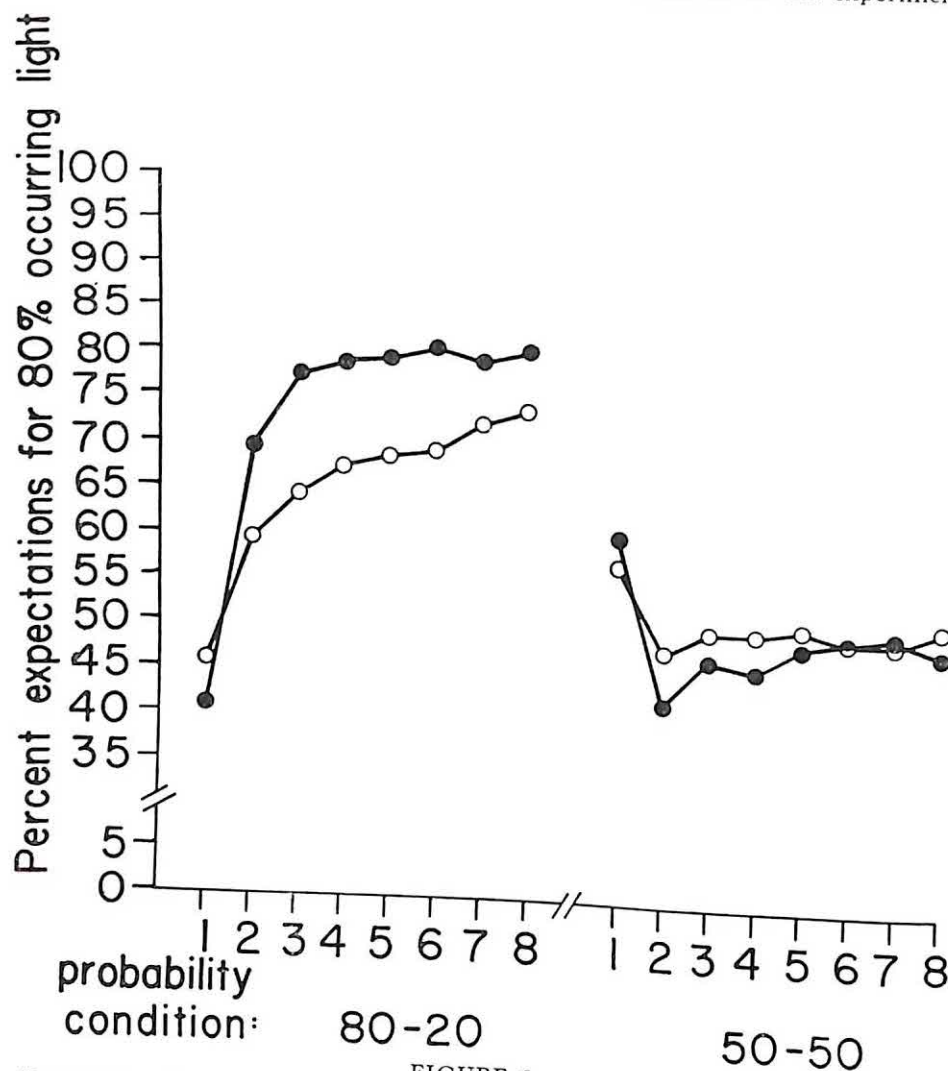


FIGURE 2

Percentage of expectations for the 80 per cent occurring light during 80-20 and 50-50 patterned probability learning plotted in 10-trial blocks. The open circles represent the learning curves of the younger children; the closed circles, those of the older children.

Figure 2 presents the learning curves of the two groups of children during the two patterned probability learning conditions of the second experiment.

In respect to initial learning during the 80-20 condition, Figure 2 indicates that the adolescent children's Ep developed much more rapidly than those of the younger children. However, in contrast to Experiment I, the younger children continued to increase their Ep throughout the 80-20 condition. Again, as in Experiment I, the learning curves of the two groups were essentially the same during the subsequent 50-50 condition. Statistical tests found: (a) The older children's initial rate of Ep acquisition was superior in the patterned 80-20 probability situation (Block 2, $P < .01$; Block 3, $P < .01$; Block 4, $P < .01$; Block 5, $P < .02$; Block 6, $P < .01$). (b) By the end of the 80-20 condition, however, Ep of the two groups of children were similar; no significant differences were found in the seventh and eight blocks of trials. (c) No significant differences occurred between the Ep of the two groups during the 50-50 patterned probability learning situation.

While the above analyses pertain to the children's probability learning in respect to their Ep , a product-measure of their probability learning, they provide no information regarding the children's ability to correctly anticipate the *stimulus patterns* presented to them. Figure 3, divided into five-block learning trials corresponding to the unit of the patterns presented, summarizes data regarding this question. Figure 3 indicates that, during both the 80-20 and the 50-50 learning conditions, the older children's performances were markedly superior. For example, in no block of trials in either learning condition, did as many as half of the younger children correctly anticipate a pattern. In contrast, in all of the last 10 blocks of 80-20 probability learning trials and in all of the last nine blocks of 50-50 probability trials, three-fourths or more of the adolescents correctly anticipated the patterns presented. The median number of correctly-anticipated patterns during the 80-20 probability condition was 10.38 for the older children as compared with 1.50 for the younger group. During the subsequent 50-50 condition, the median number of correctly-anticipated patterns by the two groups of children was 9.00 and 1.50 respectively.

The total number of correctly-anticipated patterns was tabulated for each child for each of the two learning situations. Unpaired replicates tests were run on these data. The older children significantly identified more patterns in both probability learning conditions ($Ps < .01$). These results, when combined with the results of the previous Ep analyses of the children's patterned probability learning, suggest the following conclusions: (a) The superior rate of Ep development of the adolescents in the 80-20 probability learning situation can be attributed, to a large degree, to the fact that they expected and correctly anticipated patterned probabilities while most of the younger

children did not. The younger children more often employed molecular, trial-by-trial expectations; the older children were more likely to bring "higher-order" pattern expectations to the learning situation, and to employ them effectively. (b) In the subsequent 50-50 probability situation, while

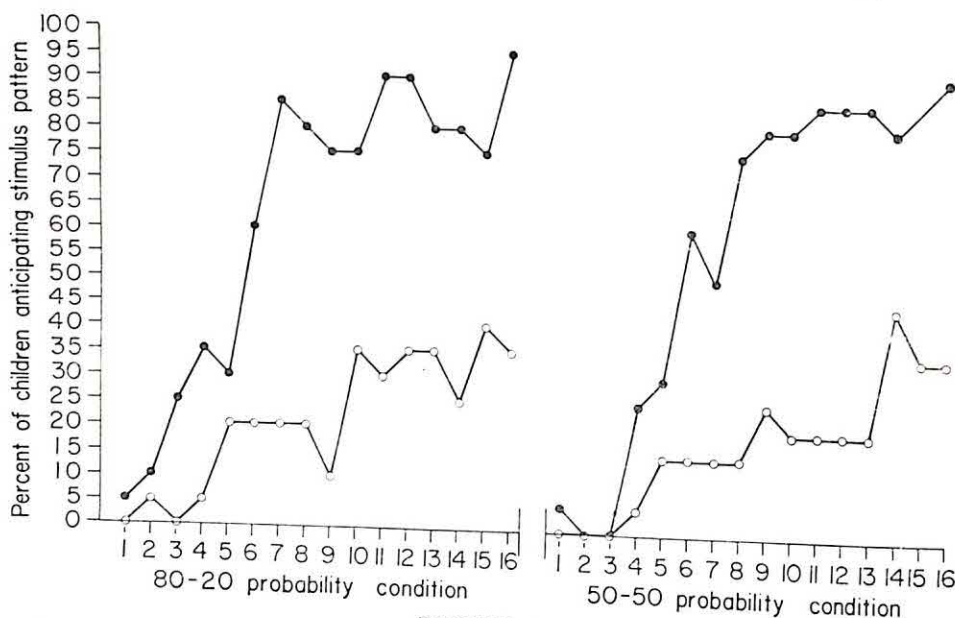


FIGURE 3

Percentage of children correctly anticipating stimulus patterns during 80-20 and 50-50 patterned probability learning plotted in 5-trial blocks. The open circles represent the anticipations of the younger children; the closed circles, those of the older children.

the mean E_p of the two groups of children were essentially the same, the *process* of their learning was dissimilar. More of the younger children characteristically responded to the 50-50 presentation of the two stimuli as though these were chance occurrences, i.e., these children ignored the possibility of temporal patterning and reacted with more-or-less random guessing. Most of the adolescents, on the other hand, anticipated and correctly identified the temporal regularity of the stimulus condition before the end of the learning period. The responses of these older children clearly reflected the use of "higher-learning" expectations to a greater degree than did those of the younger children.

C. DISCUSSION

The study found children's probability learning capacities to be a function of age in several ways. (a) In the non-patterned two-event probability

learning experiment, the mean expectation of the adolescent children during the 80-20 probability learning situation ultimately approximated the objective occurrence of the two stimuli (as has been previously found with groups of adult Ss). The Ep of the early grade-school-age children did not; these younger children anticipated the more-frequently occurring stimulus less often than did the adolescents, and anticipated it less frequently than the stimulus actually occurred. (b) During the subsequent 50-50 non-patterned probability condition, in spite of the fact that the older children had previously developed stronger expectations for the more frequent stimulus, they were able to shift these expectations rapidly enough so that they did not differ significantly from those of the younger children who had less of a shift to make. (c) In the second experiment, when temporal patterning of the stimuli was introduced to investigate age differences in the use of pattern expectations, significant differences were also found. When temporal patterning was introduced during the 80-20 probability learning situation, the younger children's Ep developed more slowly than those of the adolescents and were less often based on pattern expectations. (d) In addition, during the subsequent 50-50 patterned probability learning condition, while the Ep of the two groups of children were essentially the same, the *process* of their probability learning, as in the previous 80-20 learning situation, was not. During the 50-50 patterned probability condition, the younger children frequently responded as though the probable occurrences of the two stimuli were random; the adolescent children, on the other hand, more frequently held expectations of possible pattern relationships and, as a result, more often correctly anticipated the actual temporal patterning of the stimuli.

D. SUMMARY

The present study investigated possible age differences in children's two-event probability learning. Two groups of children were employed as Ss in the study; one group was comprised of twenty 15-, 16-, and 17-year-old adolescents, and a second group contained twenty 6-, 7-, and 8-year-olds. The children participated in two probability learning experiments administered in individual sessions. In the first experiment, the children were presented an 80-trial 80-20 probability learning condition followed by 80 trials during which the two stimuli were presented equally often. During both learning conditions, the temporal order of stimulus presentation was a non-patterned one. The probability learning of the older children was superior; their expectations for the more-frequently occurring stimulus during the 80-20 probability learning period developed more rapidly than those of

the younger children, and their mean expectations for the two stimuli eventually approximated the actual probability of stimulus occurrence (as has been found with adult Ss in previous research) while the mean expectations of the younger children did not. Also, in spite of the fact that the adolescent children developed stronger expectations for the more-frequent stimulus during the 80-20 condition, they shifted their expectations during a subsequent 50-50 learning situation as readily as did the younger children. Interviews with the children following the experiment suggested that the older children may have employed "higher-order" pattern expectations more often than the younger children. To test this possibility a second experiment was conducted one year later, employing the same children as Ss. This experiment duplicated the first experiment with one exception: a temporal patterning of the stimuli was introduced. During the 80-20 learning period a 4-1, 4-1 pattern was employed, and during the subsequent 50-50 condition, a 5-5 pattern was used. Again the probability learning of older children was superior. During the 80-20 probability learning period, their acquisition of expectations for the more-frequent stimulus was significantly more rapid than that of the younger children, and during both probability learning situations they correctly identified more stimulus patterns.

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COMPARISON OF MALE AND FEMALE KINDERGARTEN CHILDREN ON THE WISC*¹

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In a report on the standardization procedure for the Wechsler Intelligence Scale for Children, Seashore, Wesman, and Doppelt (4) indicated that in the final analysis some small sex differences in the IQ scores were apparent. As a group the boys were slightly superior to the girls; however, this difference was primarily for older age groups. At the early age levels girls were, in general, slightly superior to boys. The authors advanced three possible explanations to account for the sex differences: (1) tests are fair but sex differences in ability exist, (2) no sex differences in ability exist but the test includes biased items, and (3) sampling was biased.

A. PURPOSE

The scope of this investigation is presented in the following two questions: (1) Are statistically significant sex differences apparent on the WISC IQ scales and sub-test scores? (2) Are statistically significant sex differences apparent between correlations computed between any two WISC measures? Thus part of this study was directed toward an attempt to test the third explanation above by essentially replicating the WISC standardization procedure.

1. *Selection of Subjects*

The subjects were selected from children who were either living in Iowa City homes or residing in towns immediately surrounding Iowa City and who were expected to enter the kindergarten classes of the Iowa City schools in September, 1958. Seventy-five girls and 75 boys were selected randomly from lists of entering children made available through the office of the Iowa City Superintendent of Schools.

2. *Sampling Procedure*

The proportion of kindergarten children scheduled to enroll at each school (out of the total number of children expected to enter kindergarten classes)

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was determined; the appropriate proportion of children (of the total sample of 150) was then selected from the kindergarten enrollees of each school. An equal number of boys and girls was selected from each school, exclusive of children of University of Iowa students, rural children, and twins. Children of University of Iowa students living in temporary married-student housing were excluded because it was difficult to classify these families on a socio-economic scale, and it was felt that adequate testing facilities would not be available in their homes. Rural children were eliminated because difficulties encountered in securing the cooperation of these families did not warrant their inclusion. Twins were eliminated because a disproportionate number of twins in either sex group might substantially affect obtained scores on certain language measures. The results of analysis of these language measures are reported elsewhere (7).

Subjects were restricted to physically normal, white children who were from monolingual homes, were considered to be normal in intelligence (that is, with Full Scale IQ's of 70 or above on the WISC²), were presently considered by their parents not to stutter, and were found to have normal hearing. The children's hearing was tested by a portable Microtone ADC audiometer at 4,000 cycles at an intensity level of 20 db. This screening procedure, as reported by House (1) and House and Glorig (2), accomplishes essentially the same purpose as any presently used screening method.

In addition, information was secured upon which a comparison of the boys and girls could be based, as indicated below: *Chronological Age*: The CA of each child was determined to the nearest month. *Socio-economic Status*: The socio-economic class of the child's family was estimated through the use of Warner, Meeker, and Eels' "Index of Status Characteristics" (5). *Intelligence*: Each child was administered the Wechsler Intelligence Scale for Children (6). All tests were administered by the junior author. Except in the case of two boys, all tests were conducted in the child's home, usually in his bedroom or in a playroom.

B. RESULTS

Means and standard deviations for chronological age, socio-economic status scores, and WISC IQ's and sub-tests are indicated in Table 1. The mean IQ scores are very similar to those reported by Seashore, Wesman, and Doppelt (4) for 5½-year-old children. The *t* tests, summarized in Table 2, indicate

² Three boys were eliminated because they received WISC Full Scale IQ's below 70.

a statistically significant difference favoring the girls on the Performance Scale IQ.

TABLE 1
MEANS AND STANDARD DEVIATIONS FOR CHRONOLOGICAL AGE, SOCIO-ECONOMIC STATUS SCORES, AND WISC IQ AND SUBTESTS FOR BOYS, GIRLS AND SEXES COMBINED

Measure	Boys		Girls		Sexes combined	
	Mean	SD	Mean	SD	Mean	SD
CA (months)	63.76	2.65	63.24	2.83	63.50	2.65
Socio-economic status	42.07	12.57	42.90	11.53	42.93	12.08
Verbal-scale IQ	100.05 (99.5)*	13.71 (13.8)	100.95 (99.8)	9.75 (13.4)	100.50	11.91
Performance Scale IQ	98.23 (98.6)	12.49 (16.9)	102.76 (101.0)	10.34 (13.9)	100.49	11.66
Full scale IQ	99.07 (99.0)	12.85 (15.4)	101.95 (100.4)	9.22 (13.2)	100.51	11.27
Information	9.60	2.83	10.26	2.24	9.93	2.45
Comprehension	10.73	3.16	10.15	3.00	10.44	3.16
Arithmetic	10.47	3.16	10.57	2.45	10.52	2.83
Similarities	8.52	2.45	9.46	2.45	8.99	2.65
Vocabulary	10.79	3.16	10.29	2.65	10.54	2.83
Picture completion	9.89	2.00	10.21	2.00	10.05	2.00
Picture arrangement	10.56	2.65	11.16	2.45	10.86	2.45
Block design	8.94	2.83	8.85	2.45	8.90	2.65
Object assembly	10.01	2.24	10.21	2.45	10.11	2.45
Coding A	9.28	2.45	11.51	2.65	10.39	2.83

* Values in parentheses are means and standard deviations from the WISC norms.

TABLE 2
SUMMARY OF *t* TESTS FOR TESTING SIGNIFICANCE OF DIFFERENCES BETWEEN BOYS AND GIRLS IN CHRONOLOGICAL AGE, SOCIO-ECONOMIC STATUS, AND WISC VERBAL, PERFORMANCE, AND FULL SCALE IQ (DF = 148)

Measure	Difference between larger and smaller mean	<i>t</i>	Level of significance
CA	.52	1.14	.30
Socio-economic status	.85	.43	.70
WISC verbal scale IQ	.90	.55	.70
WISC performance scale IQ	4.53	2.41	.02
WISC full scale IQ	2.89	1.57	.20

In order to determine whether the sexes differ on the sub-tests, an analysis of variance, designated by Lindquist (3) as a Type I design, was performed for the Verbal Scales and Performance Scales separately. The analyses are summarized in Tables 3 and 4.

TABLE 3
SUMMARY OF ANALYSIS OF VARIANCE FOR EVALUATION OF WISC VERBAL SUB-TEST DIFFERENCES (SCALED SCORES) BETWEEN BOYS AND GIRLS

Source	df	ss	ms	F
Between sexes	(149)	2574.14		
Sexes (S)	1	3.07		
Error (b)	148	2571.07	3.07	.18*
Within sexes	(600)	3910.40	17.37	
Subtests (A)	4	260.55	65.14	
Sex $\times$ subtest (S $\times$ A)	4	69.66	17.42	2.88**
Error (w)	592	3580.19	6.05	
Total	749	6484.54		

* $F = ms_S/ms_{error(b)}$. $F_{.05}$ and $.01$ (nearest tabled $df = 1$ and 120) = 3.92 and 6.85.

** $F = ms_{SA}/ms_{error(w)}$. $F_{.05}$ and $.01$ (nearest tabled $df = 4$ and 120) = 2.45 and 3.48.

TABLE 4
SUMMARY OF ANALYSIS OF VARIANCE FOR EVALUATION OF WISC PERFORMANCE SCALE SUB-TEST DIFFERENCES (SCALED SCORES) BETWEEN BOYS AND GIRLS

Source	df	ss	ms	F
Between sexes	(149)	2303.73		
Sexes (S)	1	79.38		
Error (b)	148	2224.35	79.38	5.28*
Within sexes	(600)	3053.20	15.03	
Subtests (A)	4	314.93	78.73	
Sex $\times$ subtest (S $\times$ A)	4	125.71	31.43	7.12**
Error (w)	592	2612.56	4.41	
Total	749	5356.93		

* $F = ms_S/ms_{error(b)}$. $F_{.05}$ and $.01$ (nearest tabled $df = 1$ and 120) = 3.92 and 6.85.

** $F = ms_{SA}/ms_{error(w)}$. $F_{.05}$ and $.01$ (nearest tabled $df = 4$ and 120) = 2.45 and 3.48.

A significant sexes $\times$ sub-tests interaction on both the Verbal and Performance Scales necessitated a separate t test analysis for each sub-test. Statistically significant differences (Table 5) favoring the girls were found on the Similarities and Coding A sub-tests.

Pearson product-moment correlations among the WISC measures are presented in Tables 6, 7, and 8. Very few of the differences between correlations computed for boys and girls separately were statistically significant. Most of the significant differences, eight of 12, occur among the Verbal Scale corre-

lations. In all 12 instances male correlations were higher than female. In general, the sexes-combined correlation coefficients are very similar to those reported by Seashore, Wesman, and Doppelt (4) and Wechsler (6) for 7½-year-old children.

TABLE 5
SUMMARY OF *t* TESTS FOR EVALUATION OF SEX DIFFERENCES FOR EACH VERBAL
AND PERFORMANCE SCALE SUB-TEST

Subtest	Difference between largest and smallest mean	<i>t</i>	Level of significance
Information	.66	1.58	.20
Comprehension	.58	1.15	.20
Arithmetic	.20	.22	.90
Similarities	.94	2.53	.05
Vocabulary	.50	1.04	.30
Picture completion	.32	.97	.40
Picture arrangement	.60	1.43	.20
Block design	.09	.21	.90
Object assembly	.20	.52	.70
Coding A	2.23	5.32	.01

C. DISCUSSION

In this investigation a statistically significant difference of 4.53 in IQ scores favoring the girls was observed on the Performance Scale. This difference was slightly larger than the 2.4 IQ points found in the standardization sample. On the basis of these two investigations it would seem reasonable to infer that five-year-old girls perform better than five-year-old boys on the WISC Performance Scale IQ. This difference would appear to be due either to differences in ability or to test items favoring girls, but presumably it is not the result of biased sampling.

It should be noted that the mean IQ scores for the subjects in this investigation resemble closely Wechsler's norms (4, 6). This fact would seem to indicate that WISC IQ scores of children of kindergarten age have been relatively stable in the last 10 years.

D. SUMMARY

The purpose of this investigation was to determine whether statistically significant differences are apparent between kindergarten-aged boys and girls on the WISC IQ and sub-test scores and on correlations computed between any two WISC measures.

One hundred and fifty children (75 boys and 75 girls) were randomly selected from children expected to enter the kindergarten classes of the

TABLE 6
 Pearson Product-moment Correlations Between WISC Verbal Scale Sub-tests and Verbal, Performance, and Full-Scale IQ's for Boys (B), Girls (G), and for Boys and Girls Combined (C). The Fisher-z Test was Employed to Detect Statistical Significance of Differences Between Correlations for Boys and Girls Computed Between Any Two Variables. Italicized Figures Indicate a Statistically Significant Higher Correlation At or Beyond the .05 Level in the Case of Either Sex.

		Comprhen.	Arith.	Simil.	Vocab.	Verbal IQ	Perform. IQ	Full-Scale IQ
Infor.	(B)	.37	.47	.26	.50	.72	.40	.64
	(G)	.23	.14	.05	.18	.52	.27	.47
	(C)	.29	.33	.18	.35	.64	.36	.58
Comp.	(B)		.28	.41	.44	.71	.42	.64
	(G)		.11	.17	.38	.70	.11	.49
	(C)		.20	.27	.42	.70	.26	.56
Arith.	(B)			.32	.43	.70	.51	.70
	(G)			-.05	.18	.46	.32	.46
	(C)			.15	.32	.61	.43	.61
Sim.	(B)				.39	.64	.30	.70
	(G)				.23	.48	.15	.38
	(C)				.29	.56	.26	.49
Vocab.	(B)					.71	.40	.64
	(G)					.69	.44	.65
	(C)					.74	.36	.64
Verbal IQ	(B)						.57	.90
	(G)						.42	.85
	(C)						.51	.88

* $r .05$ (nearest tabled $df = 70$) = .23, $r .01$ (nearest tabled $df = 70$) = .30.

** $r .05$ (nearest tabled $df = 150$) = .16, $r .01$ (nearest tabled $df = 150$) = .21.

TABLE 7

Pearson Product-moment Correlations Between WISC Performance Scale Sub-tests (Standard Scores) and Verbal, Performance and Full Scale IQ's for Boys (B) and Girls (G) and for Boys and Girls Combined (C). The Fisher-z Test Was Employed to Detect Statistical Significance of Differences Between Correlations for Boys and Girls Computed Between Any Two Variables. Italicized Figures Indicate a Statistically Significant Higher Correlation At or Beyond the .05 Level in the Case of Either Sex.

		Picture arrang.	Block desg.	Object assem.	Coding	Verbal	Perform.	Full- scale
Picture comp.	(B)	.33	.24	.34	.34	.40	.53	.51
	(G)	.07	.14	.23	.15	.27	.49	.45
	(C)	.21	.19	.29	.13	.35	.52	.48
Picture arr.	(B)		.40	.46	.38	.45	.74	.66
	(G)		.30	.16	.30	.28	.62	.53
	(C)		.35	.32	.36	.38	.69	.61
Block desg.	(B)			.43	.42	.42	.75	.64
	(G)			.14	.22	.17	.62	.46
	(C)			.28	.29	.32	.68	.56
Object assem.	(B)				.38	.33	.75	.59
	(G)				.18	.17	.58	.44
	(C)				.27	.26	.66	.51
Coding	(B)					.36	.67	.57
	(G)					.35	.64	.58
	(C)					.34	.67	.57
Performance IQ	(B)							.86
	(G)							.83
	(C)							.85

* $r .05$ (nearest tabled $df = 70$) = .23, $r .01$ (nearest tabled $df = 70$) = .30.

** $r .05$ (nearest tabled $df = 150$) = .16, $r .01$ (nearest tabled $df = 150$) = .21.

Iowa City schools in September, 1958. The sample was restricted to physically normal, white, non-stuttering, monolingual, normal-hearing (as determined by a pure tone screening test), mentally normal (WISC Full Scale IQ of 70 or above) children. The mean chronological age of the children was approximately 63 months.

TABLE 8

Pearson Product-moment Correlations Between WISC Verbal and Performance Sub-tests for Boys (B), Girls (G), and Boys and Girls Combined (C). The Fisher-z Test Was Employed to Detect Statistical Significance of Differences Between Correlations for Boys and Girls Computed Between Any Two Variables. Italicized Figures Indicate a Statistically Significant Higher Correlation At or Beyond the .05 Level in the Case of Either Sex.

	Infor.	Comp.	Arith.	Simil.	Vocab.
Picture comp. (B)	.35*	.28	.38	.16	.25
(G)	.14*	.12	-.02	.31	.23
(C)	.26**	.20	.21	.24	.23
Picture arr. (B)	.28	.31	.35	.32	.34
(G)	.17	.05	.33	.00	.29
(C)	.24	.18	.34	.18	.30
Block desig. (B)	.32	.24	.41	.16	.34
(G)	.16	.01	.20	.02	.10
(C)	.25	.14	.32	.09	.24
Object assem. (B)	.20	.37	.28	.13	.21
(G)	-.01	-.03	.19	.14	.22
(C)	.10	.17	.23	.14	.21
Coding (B)	.23	.23	.34	.27	.25
(G)	.32	.19	.23	.01	.28
(C)	.30	.16	.27	.20	.21

* $r .05$ (nearest tabled $df = 70$) = .23, $r .01$ (nearest tabled $df = 70$) = .30.

** $r .05$ (nearest tabled $df = 150$) = .16, $r .01$ (nearest tabled $df = 150$) = .21.

Statistically significant differences favoring girls were found on the Performance Scale IQ and on the Similarities and Coding A Sub-tests. In only a few instances were the differences between correlations, computed for boys and girls separately, statistically significant. In general, the mean IQ scores and intercorrelations compare very closely with the WISC norms for children of comparable age levels.

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THE DEVELOPMENT OF THE ADDITIVE COMPOSITION
OF CLASSES IN THE CHILD: PIAGET
REPLICATION STUDY III*

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This is the third² study in a series devoted to the systematic replication of experiments originally performed by the Swiss psychologist, Jean Piaget. For its starting point the present study takes one of Piaget's (1942) investigations dealing with the child's ability to additively compose classes (include partial classes within a total class.) In his work Piaget assumed that the ability to include classes indicated the attainment of logical (abstract) class conceptions. By studying the ability of children of various ages to include classes Piaget sought to trace the developmental steps in the formation of abstract conceptions of classes.

To test for the child's ability to additively compose classes Piaget made use of the "wooden beads" experiments.³ The purpose of these experiments was to determine whether the child could tell that the number of elements in a total class was greater than the number of elements in one of its sub-classes. For example the child was shown a box of brown wooden beads and a box of less numerous white wooden beads. After the child agreed that all the beads were wooden, he was asked whether there were more wooden or more brown beads in the two boxes.

Experimenting with children of various ages Piaget found three age related stages in the development of the ability to include classes. At the first stage (usually ages five-six) children had a general, gestalt-like, impression of a total class and demonstrated⁴ they knew the wooden beads were

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¹ This study was carried out while the author was staff psychologist at the Beth Israel Hospital in Boston. The author is grateful to Dr. Grete L. Bibring, head of the psychiatric department, and the members of the research committee for granting him the time to make the study.

² For the first two studies cf. Elkind (1961a; 1961b).

³ For an identification, questionnaire, and learning approach to the study of class inclusion cf. Welch (1940).

⁴ Piaget's first and second stage subjects grasped without difficulty that if all the wooden beads were taken out and put in an empty box there would be none left whereas if only the brown ones were taken out the white ones would remain.

also brown and white. But when forced to break down this impression and compare part against whole (the brown with the wooden beads) the children behaved as if the whole class was destroyed and compared one partial class (the brown beads) with the other partial class (the white beads).

Children at the second stage (usually ages five-six) had a more differentiated conception of a general class and its sub-classes. When these children were asked to compare part with whole, the whole was not destroyed but identified with the part. The children at this stage said that the brown beads were "the same" as the wooden beads. Sometimes by trial and error children at the second stage were able to discover that the brown beads were less than the wooden beads.

Third stage children (usually ages seven-eight) had an abstract conception of classes and said immediately that the wooden beads were more than the brown beads because there were white (wooden) beads as well.

Because the class "wooden beads" was artificial in the sense that it had no specific name, Piaget used several control tests with total classes having proper names. One of the control tests involved asking the child whether there were more boys (girls) or more children in the classroom. This control test was only briefly reported by Piaget and the present study attempted to replicate it using a large number of subjects. One purpose of the replication study was to determine whether Piaget's stages were significantly related to age.

B. METHOD

1. *Subjects*

One hundred children attending the Claflin School⁵ in Newton, Mass., were tested. Twenty-five children were selected at random from each class from kindergarten to third grade. The mean age and standard deviation for each class was: Kindergarten, $M = 5-8$, $SD = 3.0$; Grade 1, $M = 6-9$, $SD = 3.9$; Grade 2, $M = 7-8$, $SD = 3.6$; Grade 3, $M = 8-7$, $SD = 3.8$ months. The majority of the children came from middle to upper middle class homes. The mean IQ for all the children in the school was 109 (on the Kuhlmann-Anderson Intelligence Test).

2. *Procedure*

Each child was seen individually and asked the following questions: (a) How many children are there in your class? (b) How many boys in the

⁵ The author is grateful to Dr. Harry Anderson, principal of the Claflin School, and to the teachers for their very friendly cooperation.

class? (c) How many girls in the class? (d) Are there more boys (or girls depending upon the sex of the child being questioned) or more children in your class? Those children who answered incorrectly were asked (e) What are children? and then question (d) was asked again. The questions were repeated as often as necessary to insure the child's attention and understanding.

3. Categorization of Responses

Questions (a, b, c) were asked only to orient the children to the problem and to help them differentiate the classes. Ninety-two of the children had no idea of how many children, boys, or girls were in the room and simply said they didn't know. Three of the children made up fantastic figures. Of the older children only five actually knew the correct number of boys, girls, and children in the classroom.

The responses to question (d) were categorized according to Piaget's stages. All responses indicating the partial class was greater than the total class (e.g., more boys than children, more boys than girls = children) were categorized as Stage I responses. Responses indicating that the partial class was identical with the total class (e.g., they are the same, boys are children) were categorized as Stage II responses. Those answers which stated that the children were more than the boys or the girls were categorized as Stage III responses.

C. RESULTS

Table 1 shows the per cent of children giving Stage I, II, or III responses for the four age groups. The χ^2 for all the cells in the table was 12.59 and was significant beyond the .05 level. The stages were related to age in agreement with Piaget's findings. The small per cent of subjects at the second stage was unexpected. However, since it is a transitional stage it may be shorter in duration than the other two stages and perhaps does not occur at all in some children.

TABLE 1
PER CENT OF CHILDREN AT EACH STAGE OF ADDITIVE COMPOSITION
OF CLASSES FOR FOUR AGE LEVELS

N	Age group	Stage		
		I	II	III
25	5	50	12	48
25	6	32	12	56
25	7	12	12	76
25	8	8	—	92

To make concrete the children's performance at each of the stages, records from the present study are presented below.

Joan, age 6, No. 10

How many children are there in your room? "Twenty." How many girls? "I don't know." How many boys? "I don't know." Are there more girls or more children in your room? "There are more boys than girls." Are there more boys than children? (Joan counts to herself) "More boys." And what are children? "They are boys and girls." Then are there more boys or more children in your room? "More boys."

Joan knows at the verbal level that boys and girls are children but as soon as part and whole must be compared, dealt with logically, the total class is apparently destroyed and only the parts are retained in the child's mind for comparison. This example is much like those presented by Piaget in reporting his bead experiments. Below is another record from the present study.

Sue, age 6, No. 24

Are there more children or more girls in your room? "There is just the same amount." Really just as many girls as children? "More children because I mean more girls, girls is better than boys always fight so got a new girl." What are children? "Boys and girls." Are there more girls or more children in your room? "More girls." And what are children? "Boys and girls."

Sue has just reached the second stage and says the girls and the children are the same amount. But when pressed she became confused like the first stage children saying there were more girls than children. The following two records are from children at the third stage. One child solves the problem logically, the other one solves it mathematically.

Mitch, age 8, No. 19

Are there more boys or more children in the room? "Looks like more children because the whole class is children and just the boys is not the whole class."

Paul, age 8, No. 92

How many children in your class? "Twenty-five." How many girls? "Thirteen." And how many boys? "Twelve." Are there more boys or more children in your room. "More children." Why is that? Because thirteen and twelve makes twenty-five and twenty-five is more than twelve."

As these examples indicate, children at the first and second stages as well as those at the third were able to give verbal definitions of children (besides boys and girls the most frequent were: little people, persons, kids) suggesting additive compositive of classes. Yet these same children were not able to dissociate and compare the part with the whole. Several factors probably account for this apparent contradiction: (a) verbal facility may advance more rapidly than the development of logical ability; (b) the copula "is" may have been used by the children only in the identity sense (children are the same as boys and girls) and not in the predicative sense (children have the property of being people) or in the inclusion sense (children are in the class of people or boys and girls are in the class of children). Because of this ambiguity of language success in comparing classes quantitatively is probably a better index of the ability to include classes than is a qualitative verbal definition.

D. DISCUSSION

The results of the present study were in agreement with Piaget's finding of three age related stages in the development of the child's ability to additively compose classes. The discussion will briefly summarize Piaget's interpretation of these developmental stages.

According to Piaget the difficulty in composing classes experienced by the children at the first and second stages can be described in either of two ways. From the *extensive* point of view (considering the elements possessing the class property) the child's difficulty arises from his inability to think of the same set of elements in two classes at once. At the early stages the child's thought still reflects realism (Piaget, 1929) in the sense that the child takes his mental construction, a class, for a real spatial entity. In the present study, for example, when the child thought of some of his peers in the class of "boys" he used them up, so to speak, by putting them in one class and was not able to put them in another class which due to his realism constituted a second "place." This explains why so many of the children answered "more boys than girls" or the reverse even though the question asked was whether there were more boys (girls) or more children. After classifying some of the children as boys only girls remained (or boys if girls were classed) and so the subjects compared the two part classes.

From the *intensive* point of view (considering the class properties) the child's difficulty arises from his inability to think of a single element possessing two properties at once. At the early stages of class composition, conceptions of classes are not clearly differentiated from object conceptions. The

child's realism is such that properties like "brown" and "boy" still have a concrete object connotation. For these children once something is *a* brown or *a* boy it cannot also be *a* wooden or *a* child just as a bead cannot be a block.

Piaget attributes the child's difficulties with extension and intension to the irreversibility of his thought. Once the child has conceived a set of objects as being in one class (or possessing one property) he cannot return to the starting point of his mental construction and re-conceive the same set of objects as being in a second class (or possessing a second property). Once, however, the child has developed the necessary mental structures he can return to the starting point of a mental problem and discover that the same elements can be conceived in two classes simultaneously and as possessing two properties at once.

It is also possible, according to Piaget, to formulate the class inclusion problem in logical terms and to make a logical reconstruction of the processes leading to the children's success and failure with including classes. From the logical point of view a class is a set of objects possessing a common property, and is capable of being symbolized and of being operated upon. To add classes is to form the smallest class which will contain all the elements in the constituent classes. This operation is symbolized $A + A' = B$. From this equation it follows logically that $A = B - A'$ and that $A < B$ (A is less than or included in B). These three operations form a group which leaves the total class invariant. Since a logical class remains invariant regardless of empirical events every logical class presupposes this group of operations.

By means of this logical paradigm it is possible to discover just where, in the logical sense, the first and second stage children met with difficulty. These children all had a conception of a general class made up of sub-classes. In Piaget's study the children knew the wooden beads were brown and white and in the present study the subjects knew that children were boys and girls. Implicitly they were capable of the operation $A + A' = B$. Likewise these children could easily judge one set of beads as greater than another or could tell if there were more girls or boys. So they were also capable, implicitly, of the operation $A < B$. The child's difficulty was therefore not in forming classes or in performing operations but rather in the grouping of the operations. Without a grouping of operations the whole does not remain the same when its relation to the parts changes.

The young children performed an operation and then stopped as if unaware of the implications of the proposition they had formed. They seemed unable, or not to feel the need, to coordinate one proposition or operation with the

other. It was only when at the third stage children grouped operations "The children are more because it is boys and girls ($A + A' = B$) and boys are not so many ($A < B$)" that the invariance of the whole class was retained.

In brief Piaget holds that psychologically the inability to include classes arises from the irreversibility of the child's thought while logically it derives from his inability to group operations so that the whole remains invariant whatever the relationship between whole and part.

E. SUMMARY

One hundred children between the ages of five and eight were tested for their ability to additively compose classes in a systematic replication of one of Piaget's studies. The results agreed with Piaget's finding of three age related stages in the development of the ability to form class inclusions. Briefly presented was Piaget's interpretation that psychologically the inability to compose classes arises from the irreversibility of the child's thought while logically it derives from the child's inability to group operations so that the total class remains invariant despite changing relations with its parts.

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JUDGMENTS BY SOCIAL WORKERS ON BOYS AND MOTHERS IN FATHERLESS FAMILIES*

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A. THE FATHER'S ABSENCE

This paper reports an impromptu survey of social workers on the effects of the father's absence. The survey consisted of eight comparative questions, and focused primarily on the behavior of adolescent boys who were without fathers in early childhood. The results suggest that the father's absence (as defined here) does intensify problems of identification and psychosexual development for boys. The data also furnishes a bit of evidence on the association between the father's absence and juvenile delinquency, and on the marital stability of persons who have come from fatherless homes.

The opportunity for this survey presented itself when the author was invited to substitute as chairman for a series of three meetings on work with mothers without husbands, at the 1959 New England Regional Conference of the Child Welfare League of America. The series of meetings was attended by 37 social workers; most of them had had professional experience with fatherless families.¹

B. METHOD

Before the first meeting, each social worker was asked to write down the names of five mother-child families, each containing a boy who was now at least 10 years old, which he felt he knew fairly well. A mother-child family was defined as a family in which, during the first six years of the son's life, there was usually no man living in the home. After the respondents had

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chosen their mother-child families, they were then asked to write down the names of five father-mother families, also containing a boy at least 10 years old. A father-mother family was defined as a family in which, during most of the first six years of the son's life, the mother's husband was living in the home. The respondents were asked to choose the father-mother families in such a way as to match each mother-child family with a father-mother family, on the basis of neighborhood type, social class, ethnicity, and the completeness of the social worker's knowledge of the mother, the boy, and the family history. In other words, each social worker was asked to write down, for his own reference, five matched pairs of families, with each pair containing one mother-child and one father-mother family.

While potentially this procedure might have yielded over 150 matched pairs of families, the actual number of comparisons for each question was quite small. Lacking case records and with limited time, the choice of the matched pairs of families proved a formidable task. Although a few social workers were able to choose five pairs, most respondents could only choose one or two. A minority of the attending social workers could not participate in the survey at all, because they were supervisors with no active case loads or because they felt the task of choosing the pairs was beyond them. Finally, for those questions which required a comparison between the two boys (or mothers) within a matched pair, respondents were requested to answer only for pairs in which they felt there was a clear difference; this further attenuated the number of responses to the comparative questions.

After respondents had chosen their paired families, they answered eight questionnaire items about them: two questions at the beginning of the first meeting, three questions at the beginning of the second meeting, and three questions at the beginning of the third meeting. In all cases a question was asked before the general topic to which it pertained was discussed. However, most of the questions were asked (unavoidably) after respondents had become acquainted with the author and with other group members, and had participated in discussion of families without fathers.

C. RESULTS

The eight questions and the responses to them are presented in Table 1, in the order in which they were asked.

D. VALIDITY OF THE DATA

The obvious weakness of this data is that there is no way of estimating the effect of possible respondent bias on the results. The respondents were re-

quested to answer with the greatest objectivity possible, and the author believes they tried conscientiously to meet this request. However, the questionnaire situation or "set" must have made this difficult. Most of the questions asked for evaluations in value-loaded areas; in a way, the social

TABLE 1
QUESTIONNAIRE AND RESPONSES

Questionnaire items		Mother-child family	Father-mother family	P value ¹
1. Does the boy belong to a delinquent gang (or has he in the past)?	Yes:	20	12	
	No:	30	38	
2. Which boy appears to be the most anxious about sex?		25	9	<.01
3. Which boy is most effeminate?		18	5	<.01
4. Which boy shows the greatest hostility toward older men?		12	6	
5. Which mother is most jealous of her son's girl friends?		12	1	<.002
6. Which mother has the most negative attitudes toward men?		19	3	
7. In the first six years of the son's life, was there ever a man living in the home?	Yes:	20		
	No:	7		
8. Did the parents come from a mother-child family?	Mother	Yes:	11	
		No:	10	
	Father or main boyfriend	Yes:	13	
		No:	11	

¹ Normal approximation to binomial. Freund (1952), pp. 137-139.

workers were asked to judge whether the mother-child family was "worse" than the normal family. In discussion many of the respondents expressed concern about the adverse effects of the father's absence; in general, they seemed to feel it was a "bad thing" to separate children from the father. This general attitude must have posed a challenge to their powers of objectivity when answering the specific questionnaire items.

Some of the results are so striking that the author is persuaded that they probably do reflect real differences resulting from the father's presence or absence. However, since the design does not permit an estimate of bias, the data from the evaluative questions is of only suggestive value. Keeping this limitation in mind, the author would like to discuss very briefly the significance of some of these judgments.

E. DISCUSSION

1. *Sex-Role Identity*

One obvious question posed by the fatherless family is: does the absence from the home of an adult male figure affect the masculinity of boys? Or, to put it differently: if a father or father-figure is usually absent from the home during the first six years, do boys tend to identify strongly with women, and not to identify with men? The responses to Question 3 do indicate a significant tendency for the mother-child family to produce boys who are more overtly feminine. This in turn supports the notion that a vital function of the father is to serve as an identification model for boys.

2. *The Oedipus Complex*

The Oedipus complex (for males) may be conceptualized as consisting of two parts. The first part is mutual attachment between mother and son. The importance of sex in this attachment is subject to dispute. However, most theorists would probably agree that the attachment may often have sexual overtones. The second part is resulting rivalry between son and father (2, p. 122) (3, p. 44) (6, pp. 83-84) (7, p. 25) (8, pp. 203-208) (9, p. 67-74). An additional question posed by the mother-child family is: what happens to these two parts or phases of the Oedipus complex when the father is absent?

In regard to the first part, sexual frustration of the parent has been cited as an intensifier of the Oedipal attraction:

Concerning chronic influences, a child's reactions and wishes toward the parents depend on their behavior and personalities Very often the mother loves the son and the father loves the daughter. The parents' unconscious sexual love for their children is greater when their real sexual satisfaction, due to external circumstances or to their own neuroses, is insufficient. This love is felt by the children unconsciously as a sexual temptation, increasing their Oedipus complex . . . (1, p. 93).

It might be expected that mothers without husbands usually have less satisfactory sexual outlets, and therefore might be more likely to be "seductive" toward their children. The responses to Question 5 do support the notion that the mother-child family mothers tend more to be sexually attached to their sons.

There is some cross-cultural evidence that societies in which mothers must observe long periods of sexual continence are characterized by a rather high level of anxiety about sex (10). This could also be interpreted as a result of maternal seduction: in societies where mothers are sexually deprived they

are more likely to be seductive to their children, thereby producing a general condition of sex anxiety. Question 2 was asked to test for a parallel between the cross-cultural material and the mother-child family in our own society. The responses do indicate a higher level of sex anxiety among the mother-child family boys.

The author found no satisfactory way of inquiring about the second part of the Oedipus complex—father-son rivalry. Theoretically, we might expect the mother-child family to present two extremes in regard to Oedipal rivalry. Boys from “pure” mother-child families, in which there was never a father or father-figure who could be perceived as a rival for the mother, might evidence a minimum of rivalrous Oedipal motives. However, if a father-figure was intermittently in and out of the home, Oedipal rivalry might be even more intense than in stable families (11). The answers to Question 7 indicate that most mother-child families in this sample were not of the “pure” type; the responses to Question 4 give some slight indication of more noticeable Oedipal rivalry from the mother-child family boys. However, since the data does not tell us whether the mother-child family boys who were judged “most hostile toward father-figures” are from “pure” or “im-pure” mother-child families, it is of little use as information on Oedipal rivalry.

3. *Social Consequences of the Father's Absence*

Since previous studies show that one of the correlates of juvenile delinquency is broken homes (5, pp. 89-91), Question 1 was addressed to the association between delinquency and the mother-child family. For this sample, boys from the mother-child families more frequently belonged to delinquent gangs, but the difference is rather unimpressive.

Question 8 indicates that slightly more than 50 per cent of the mother-child family parents themselves were reared in mother-child families. If the present sample is at all representative, this finding suggests a definite tendency for the mother-child family to perpetuate itself from generation to generation.

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SOME INDICATIONS OF SOURCES OF ANXIETY IN ADOLESCENT BOYS*

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A. INTRODUCTION

In understanding the adolescent's outlook on life and its problems, it is helpful to have some indication of the problem areas which are sources of worry and anxiety for him. The forces which combine to create these anxiety areas are multiple and form a dynamically shifting constellation not only in terms of the adolescent's own development and maturation, but also in terms of the social and cultural context in which that growth occurs.

The importance of social class to the development of the adolescent's self-concept was pointed out by Klausner (7). He found a differential gradient in the self-concept in different socio-economic levels. In the upper levels greater self-aggression and psycho-social isolation was evident and in the lower levels greater insecurity combined with inferiority and aggression. Similar differences have been discovered in Gough's studies (5, 6) of status difference in high school seniors. Role-wishes have also been found to change significantly (1) from a concern with looks, stature, and mental capacity at the junior high school level to involvement in personal-social relations and social welfare at the high school level.

Over 15 years ago, Fleege (3) concluded his extensive investigation of the adolescent boy with a rating of the major problems which confronted the adolescent. His list, in order of decreasing frequency and intensity, included sex adjustment, decision in the matter of vocation, lack of understanding from older people, lack of social opportunities, financial difficulties and difficulties within the school setting. More recently, Gesell and his associates (4, pp. 341-343) summarized an intensive investigation of 165 teen-agers (including 83 boys) and listed the worries and fears of the respective age groups. The 14 year olds were worried about school, personal-social problems and to some extent world conditions. They are afraid of the dark, crowds, and to some extent of high places. Social fears began to manifest themselves in the form of fear of people, performing in public, and quarreling in the family. The 15 year olds are concerned chiefly about grades and homework as well as

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social acceptance. Their fears are somewhat greater than the 14 year olds but the content has changed little. The 16 year olds are worried about homework and examinations and their own futures. Worries of a more self-centered nature appear: appearance, character, personality problems. They have few fears, but those mentioned include new social situations and also fear of animals (snakes) and heights. These age groups correspond to the freshmen, sophomores, and juniors represented in the present study.

B. PROCEDURE AND RESULTS

The results presented in this study are drawn from a 217-item questionnaire which was administered to 1278 high school boys from nine different schools. The schools were private schools under Catholic direction and were scattered through the states of New York, New Jersey, Pennsylvania, and Maryland. The questionnaires were given in each instance with a standard set of instructions which were read to the subjects by the administrator. The test forms were sent to the respective administrators in sealed envelopes, were opened in the presence of the subjects, and immediately after completion of the test they were resealed and returned to the experimenter. The boys were selected according to classes from the school populations. As a group they represent the median range in academic achievement. The distribution according to years was as follows: 331 freshmen, 313 sophomores, 343 juniors, and 291 seniors. The age range of the total populations extended from 13 to 18 years. The average age of the freshmen was 14.3 years, the sophomores 15.2, the juniors 16.2, and the seniors 17.2. With the exception of the senior group, these age groups are roughly equivalent to the Gesell age groups. The boys were predominantly from a middle class family background.

For the purpose of this study, eight questions were selected from the questionnaire which present some indication of the problems or areas which give high school boys occasion for worry or anxiety. The questions were all free response items. For each question the responses were ranked in the order of frequency and a rank-order coefficient was computed between the rankings for respective years (2, pp. 165-167). The significance of the correlation was tested for each correlation (2, p. 167).

The questions selected as indicating areas of worry and anxiety were the following:

1. What are the things you worry about most?
2. What is your biggest personal problem or difficulty in life? (If you haven't any, write "None.")
3. What are the things you fear most? (If nothing, write "Nothing.")

4. What are the things you usually have doubts about?
5. When you feel sad and depressed or "down in the mouth," what generally causes this feeling?
6. When you feel lonely, what do you think are the causes?
7. Mention the difficulty or problem in your school life that puzzles you most. (If you haven't any, write "None.")
8. Please mention any problem of yours which has been omitted in these questions.

The results obtained from the preceding questions are contained in Table 1.

C. DISCUSSION

The results will be discussed in reference to the individual questions and then in reference to common response categories in the whole set of questions.

Question 1: The predominant causes of worry for these boys seem to center around the school and their relations to it. The family is also a consistent source of worry. Worries about sex show a numerical increase in juniors and seniors and a significant jump in rank between junior and senior year. An indicator of changing concerns is the jump in worries about their future lives from the lower to the upper classmen and the appearance in the upper classes of worry over the subject of vocation. The correlations between the years are all significant with the exception of that between the freshmen and the seniors. This would indicate a change in the patterns of worry and concern from the beginning to the end of the high school years.

Question 2: This question indicates that the great source of personal difficulty is sex. Many boys, especially from sophomore year on, manifest difficulties not only with their relationships with girls but also in personal sex habits. Masturbation is mentioned most often in second and third years of high school. School and family become less and less a source of difficulty as the boy matures. As in the previous question, there is a rise in concern with the future and with the problem of vocation. The latter seems to be a special problem for seniors. Interestingly enough, it seems that personal difficulties with parents is a problem for a few lower classmen, but after the sophomore year it is not mentioned at all. Low correlations between freshman year and the other years and a significant correlation among the other years would indicate that the most significant changes in personal problems occur soon after freshman year, i.e., around 14-15 years of age.

Question 3: Besides the "Nothing" response, the boys express a great fear of hell and an increasing fear of death. There is also an increase in the fear of failure and in the later years a fear of the future. The boys express a fear of God which seems to slacken among the juniors and seniors. A great

TABLE 1
RANK-ORDER CORRELATIONS FOR RESPONSES TO EIGHT QUESTIONS

Response category	Ranking within years								Between years	
	1	2	3	4					r	
<i>Question 1:</i>										
School	1 (206) [†]	1 (195)	1 (187)	1 (100)				1-2 =	0.84**	
Family	2 (39)	2 (27)	2 (29)	4 (20)				1-3 =	0.61*	
Sex	3 (11)	4 (9)	6 (17)	3 (23)				1-4 =	0.29	
Money	4 (10)	4 (9)	4 (22)	5.5 (19)				2-3 =	0.82**	
Popularity	5 (6)	4 (9)	5 (19)	5.5 (19)				2-4 =	0.75**	
Hell	6 (5)		10 (2)	14 (1)				3-4 =	0.84**	
Future	7 (4)	6 (8)	3 (23)	2 (36)						
Religion	8.5 (3)	8.5 (3)	10 (2)	11.5 (2)						
Sin	10 (2)	7 (5)	7 (7)	8 (12)						
Vocation			8 (3)	7 (13)						
<i>Question 2:</i>										
None	1 (104)	3 (55)	2 (51)	2 (43)				1-2 =	0.22	
School	2 (77)	2 (66)	3 (49)	7 (15)				1-3 =	0.58	
Sex	3 (69)	1 (91)	1 (102)	1 (85)				1-4 =	-0.50	
Family	4 (15)	7.5 (9)	7 (17)	9 (7)				2-3 =	0.83**	
Sin	5 (14)	12.5 (3)	9.5 (7)	10 (6)				2-4 =	0.80**	
Future	6 (12)	4 (18)	4.5 (30)	4 (30)				3-4 =	0.88**	
Popularity	7 (9)	5 (16)	4.5 (30)	5 (19)						
Parents	8 (8)	9 (8)								
Vocation	9 (6)	6 (13)	6 (20)	3 (38)						
Personality		7.5 (9)	8 (14)	6 (17)						
Religion		14 (2)	9.5 (7)	12.5 (3)						
<i>Question 3:</i>										
Nothing	1 (123)	1 (91)	1 (85)	1 (85)				1-2 =	0.82**	
Failing exams	2 (48)	3 (35)	3 (37)	8.5 (11)				1-3 =	0.52*	
Hell	3 (35)	2 (41)	2 (54)	2 (42)				1-4 =	0.64*	
Sin	4 (30)	8 (11)	5 (21)	6 (13)				2-3 =	0.62*	
Sex	5 (14)	7 (12)	8 (15)	5 (19)				2-4 =	0.49	
Death	6 (13)	4 (25)	4 (28)	3.5 (26)				3-4 =	0.66**	
Unpopularity	7 (12)	6 (16)	6 (17)	8.5 (11)						
God	8 (9)	5 (18)	9 (13)	15 (2)						
Failure		9.5 (8)	7 (16)	3.5 (26)						
Future			10 (11)	7 (12)						
<i>Question 4:</i>										
Sex	1 (43)	1 (45)	2 (40)	2 (34)				1-2 =	0.71*	
School	2 (23)	4.5 (16)	4 (13)	6 (7)				1-3 =	0.39	
Sin	3.5 (14)	4.5 (16)	5.5 (12)	5 (8)				1-4 =	0.37	
Religion	3.5 (14)	2 (24)	1 (47)	1 (47)				2-3 =	0.82*	
Vocation	6 (6)	3 (18)	3 (30)	3 (31)				2-4 =	0.88**	
Family	5 (7)	6.5 (5)	10 (1)	9 (2)				3-4 =	0.97**	
Personality	7 (4)	8 (3)	8 (4)	8 (4)						
Popularity	8.5 (3)	6.5 (5)	7 (7)	7 (5)						
Future			5.5 (12)	4 (23)						

TABLE 1 (continued)

Response category	Ranking within years								Between years r	
	1		2		3		4			
<i>Question 5:</i>										
School	1	(101)	1	(84)	1	(93)	2	(52)	1-2 =	0.90**
Disappoint- ment	2	(40)	2	(27)	2	(54)	1	(68)	1-3 =	0.80**
Family problems	3	(15)	4	(17)	4	(19)	15.5	(3)	1-4 =	0.30
Unpopularity	5.5	(9)	6	(12)	8.5	(8)	9	(7)	2-3 =	0.77**
Sin	5.5	(9)	5	(13)	6	(12)	6	(11)	2-4 =	0.39
Sex	8	(7)	3	(22)	3	(31)	3	(22)	3-4 =	0.70**
Punishment	8	(7)	7	(11)	8.5	(8)	13	(4)		
Arguments	8	(7)	9	(8)	5	(15)	5	(12)		
Personality					12	(6)	7	(10)		
<i>Question 6:</i>										
Being alone	1	(31)	2	(25)	3	(24)	4	(17)	1-2 =	0.58*
Unpopular	3	(19)	1	(35)	1	(52)	1	(49)	1-3 =	0.01
Not seeing friends	4	(10)	6	(10)	11.5	(5)	6	(14)	1-4 =	-0.19
Different interest	6	(6)	10	(5)	6	(13)	7	(12)	2-3 =	0.56*
Self-pity	10.5	(4)	12	(4)	7	(9)	9.5	(5)	2-4 =	0.69**
Sex	14.5	(1)	5	(13)	2	(30)	3	(19)	3-4 =	0.82**
Personality			10	(5)	5	(14)	2	(21)		
<i>Question 7:</i>										
None	1	(183)	1	(141)	1	(130)	1	(116)	1-2 =	0.93**
Subjects	2	(87)	2	(87)	2	(106)	2	(69)	1-3 =	0.91*
Teacher	3	(13)	3	(17)	3	(30)	3	(23)	1-4 =	0.96**
Discipline	4	(7)	5.5	(7)	4.5	(9)	5	(8)	2-3 =	0.89**
Homework	5	(6)	4	(12)	6	(8)	6	(7)	2-4 =	0.67*
Popularity	6	(2)	5.5	(7)	4.5	(9)	8.5	(4)	3-4 =	0.82**
Personality			8	(3)	7.5	(7)	4	(14)		
<i>Question 8:</i>										
Sex	1	(25)	2	(26)	2	(41)	3	(15)	1-2 =	0.36
Studies	2	(17)	1	(29)	1	(60)	1	(40)	1-3 =	-0.46
Teachers	3	(12)	3.5	(10)	3	(22)	2	(32)	1-4 =	0.39
Popularity	4	(7)	10	(2)	10.5	(1)			2-3 =	0.81**
Vocation	6.5	(5)	5	(6)	6.5	(3)	7	(3)	2-4 =	0.47
Discipline	6.5	(5)	3.5	(10)	4	(13)	4	(14)	3-4 =	0.82**
Family problems			8	(3)	5	(10)	8.5	(1)		
Religion			6.5	(4)	6.5	(3)	5	(5)		
Personality			12	(1)	8.5	(2)	6	(4)		

* The correlation is significant at the 5 per cent level of confidence.

** The correlation is significant at the 1 per cent level of confidence.

† The number in parentheses represents the absolute number of responses in each category.

many incidental responses were given to this question which are not indicated on the table: fear of punishment, responsibility, loss of parents, height, parents, pain, snakes, etc. None were mentioned with any significant frequency. Low correlations indicate a tendency for patterns of fear to shift from year to year.

Question 4: Doubts are expressed primarily about sex and religion. Doubts about sex tend to decrease as the boys mature, but at the same time doubts about religion increase. Doubts about vocation are also increasingly manifested and, in the upper years, doubts about the future. These two categories are undoubtedly related. Doubts about school and family problems, however, decrease as the boy grows older. The significant changes here also tend to occur after freshman year as indicated by the low correlation between the rankings of this group and the other groups.

Question 5: A good many of the boys admit to feelings of sadness and depression and ascribe their depression mainly to their failures in school and to disappointment and frustration in general. A major cause of such depression is found in disappointing relations with girls, especially in the older boys. Family problems (financial, arguments with parents, etc.) are a consistent source of depression among the younger boys, but there is a significant drop in such problems among seniors. Unpopularity seems to become somewhat less of a problem as the boy grows older, although some juniors and seniors seem to become depressed about their own personality development. This seems to follow the pattern of self-centeredness described by Gesell. Arguments with friends, especially girl friends, are also listed as a source of depressed feelings. Low freshman-senior and sophomore-senior correlations suggest that patterns of depression tend to alter after sophomore year. This suggestion is reinforced by the high freshman-sophomore correlation.

Question 6: High on the list of causes of loneliness is unpopularity. There is an increased tendency in later years to look on loneliness as related to personal deficiencies (sensitivity, shyness, etc.) rather than the mere fact of being alone. Feelings of loneliness are increasingly related to sex. Boys tend to feel more and more left out of things as they grow older because they may not have a girl with whom they can engage in heterosexual social activities, i.e., dances and parties. There is a significant increase in this problem from freshman to sophomore year and another significant jump from there to the upper years. The upper years correlate highly indicating a certain degree of stabilization, as compared with the low correlations in the first two years. Freshman-junior and freshman-senior correlations are especially low indicating significant changes.

Question 7: There is a fairly high degree of agreement in the pattern of school problems in each of the years. The greatest source of difficulty seems to be the choice of subjects studied. The boys want to know why they have to study the subjects they do and what use these subjects will be for later life. Great dissatisfaction is also had with the teachers—usually not in general, but rather it seems that every boy has his problems with one or possibly more teachers. Discipline and homework, as might be expected, are constant sources of difficulty.

Question 8: The question asked about problems which had been omitted from the questionnaire, but almost all responses repeated problems previously handled. Sex is a major problem area, but it slackens off here in the upper years. More important than sex are the problems the boys have with their studies. This seems to become more and more of a problem in the later years. A prominent place is given here to religious problems and vocational difficulties. Religious problems especially seem to become of greater importance in later years. Discipline and teacher-relations are also prominent, seeming to indicate with studies a predominance of preoccupations centering around the school and its activities. Only the correlations between second and third and again between third and fourth years are significant. This would suggest a constantly shifting pattern of interests and concerns as the boy develops from year to year. The freshman-sophomore and freshman-junior correlations are the lowest. Again the pattern of alteration between earlier and later years is manifest.

The responses reveal certain common patterns which would seem to indicate general areas of worry, concern and anxiety. The more or less frequent responses which recur in a number of questions are the following:

The School: School problems are a consistent source of worry to the high school boy. Although it remains a high source of concern, school becomes less and less a major area of concern as the boy grows older and other interests develop. His fear of failure decreases and drops significantly in senior year. He progressively manifests less doubt about the things he is required to do in school. Failure in school work is a consistent source of depression. When asked to mention a personal problem, most boys responded with difficulties about the reasons for studying certain subjects, e.g., Latin, Modern Language, History, etc. The biggest school problems in the order of importance were subjects, teachers, and discipline.

Sex: Sex is a consistent source of worry, difficulties, fear and doubt. Many boys of high school age are just beginning to have heterosexual experiences and there are many things they do not know. Both in the form of hetero-

sexual difficulties and of personal chastity, sex was listed as the major personal problem for sophomores, juniors, and seniors. Sex is not so much a source of fear as it is of doubt. Difficulty in getting along with girls is listed as a major cause of depression, as well as a source of feelings of loneliness, particularly for the older boys.

Popularity: This is a constant source of worry to the high school boy. It seems to become more frequent in the older boys when popularity takes on more social significance. As a source of fear and doubt, unpopularity is not a primary, but a fairly consistent problem. Feelings of depression due to unpopularity seem to decrease as the boy matures, but unpopularity is given the first rank in sophomore, junior and senior years as a cause of loneliness. There may be some relation between the predominance of unpopularity and difficulties in relations with girls as sources of loneliness among the older boys.

Immorality and Religion: From the freshman to the senior year there is an increasing amount of worry about sin, but it does not constitute a major personal problem. A fair number, especially freshmen, express their fears about sin and their doubts about it. This seems to lessen as they grow older. Immoral actions are consistently a source of depression. Religion is a cause of worry rather infrequently and is mentioned as a personal problem by only a few upperclassmen. Fear of God is mentioned by a fair number in the earlier years but takes a significant drop among seniors. However, as a source of doubt, religion becomes more and more prominent until it is listed as the primary source of doubts for juniors and seniors.

Vocation and the Future: The future becomes more and more a source of worry for the growing boy until for the seniors it takes a place second only to the school. Worry about vocation is expressed by a few juniors and a few seniors. There is a steady increase in the numbers who find the future and the problem of vocational choice a major personal problem. Among seniors, the choice of vocation is second only to sex as a personal problem. A few of the older boys express fears about the future but many more have doubts about the future as well as about their vocation in life. A few seniors indicate that vocation is the most puzzling problem they have.

D. SUMMARY AND CONCLUSION

Eight free-response questions were selected from a questionnaire administered to 1278 high school boys. The questions were selected as indicators of sources of worry and anxiety for the high school boy. The responses were ranked for each question and a rank-order correlation computed between the

respective rankings of the classes or years. The results indicate that the major sources of worry and anxiety for the high school boy of middle class background are the school, sex, unpopularity, immoral activity, religion, vocation, and his future life. The significant changes between patterns of anxiety sources seem to occur primarily after the freshman year, with some significant changes (for depression and to a lesser extent fear) coming after the sophomore year.

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ODDITY-REVERSAL AND DELAYED-RESPONSE PERFORMANCE OF MONKEYS PREVIOUSLY EXPOSED TO FOCAL-HEAD IRRADIATION*¹

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Decremental performances on problems requiring the utilization of the same stimulus cues in antagonistic response patterns (2) and on spatial delayed-response problems (1) have been determined to serve as sensitive indicators of surgically induced neural tissue damage of the prefrontal association areas of the rhesus monkey.

The present study was undertaken to determine if monkeys show decrements on these types of problem as an effect of previous focal-head irradiation. The manifestation of such decrements by monkeys previously exposed to focal-head irradiation of the prefrontal association area would suggest degeneration of neural tissue as a consequence of radiation exposure.

A. METHODS

1. *Subjects*

Nine control and six focal-head irradiation male rhesus monkeys with nearly identical training histories were used as Ss in the experiment requiring the utilization of the same stimulus cues in antagonistic response patterns. The six experimental Ss had been exposed to focal-head irradiation with X-rays approximately one-and-one-half years before this experiment was initiated.

Eight control and six experimental Ss of the first experiment were used as Ss in the delayed-response study, one control S having died in the interim. All Ss had experienced previous spatial delayed-response training, both before and following radiation exposure. The radiation exposure predated the delayed-response study by approximately two years.

Two of the experimental Ss had received 3,000 r X-ray radiation of the brain anterior to the caudal aspect of the precentral sulcus fissure. Thirty

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days later, they had received the same dosage to the same area of the brain. The other four experimental *Ss* had received equivalent dosages, with the same spacing, to an area of the head containing the inferior parietal lobule and posterior aspect of the frontal lobe.

2. Apparatus

a. Oddity-Reversal. All training of animals in the oddity-reversal experiment was conducted in a modified version of the Wisconsin General Test Apparatus, the animal's carrying cage serving as the holding cage for the test procedure. A stimulus tray holding three food wells, spaced six inches apart center-to-center, was used. The problem utilized the same three objects on both original and reversal training. These objects were a circular red-painted wood block, a circular green-painted wood block, and a triangular red-painted wood block.

b. Delayed Response. A similar modified version of the Wisconsin General Test Apparatus was used for all training on the delayed-response problems. The stimulus tray of this apparatus held two food wells, spaced 12 inches apart center-to-center. Identical square blocks, painted yellow, covered the food wells to prevent the *S* from seeing the food reward during the period of delay. Each of these blocks measured $4 \times 4 \times \frac{3}{4}$ inches.

3. Procedure

a. Oddity-Reversal. In original training, response to the object which was odd in color was rewarded and each *S* was trained to the criterion of two successive days with two errors or fewer per day. Twenty-four test trials were given each day. In reversal training, response to the object which was odd in form was rewarded and each animal was tested to the same criterion as in the original training. The non-correction method was used throughout all days of testing.

b. Delayed-Response. A spatial delayed-response trial was presented in the following manner. With the opaque screen of the WGTA raised, the attention of the *S* was drawn to the food reward which was placed in either the right or left side food well according to a predetermined random order. The wood blocks were then placed simultaneously over both food wells. After the delay, the stimulus tray carrier was advanced and the *S* allowed to make a choice. After the *S* completed the first trial, the stimulus tray carrier was withdrawn from the *S*'s reach and the second trial was begun. The *S* was allowed only one choice on each trial.

Each *S* was first tested 24 trials a day for four days on 10-second delay

problems, then, for four days on 15-second delay problems, and, finally, for four days on 20-second delay problems. The order of occurrence of randomly and constantly rewarded positions was randomized in the 24 trials presented to each *S* each day.

B. RESULTS

1. *Oddity-Reversal*

Statistical analysis of the error data, using a mixed type analysis of variance design (as shown in Table I), yielded (a) no significant difference

TABLE I
ANALYSIS OF VARIANCE OF ERROR SCORES

Source of variance	df	Mean Squares	F	P
Between-subjects	14			
Between-groups (B)	2	53.42	2.41	N.S.
Errors (b)	12	22.15		
Within-subjects	15			
Conditions (A)	1	294.54	17.92	.01
A B	2	6.16	.37	N.S.
Errors (w)	12	16.43		
Total	29			

between radiation groups, (b) a condition (original training vs. reversal training) effect which was significant beyond the 1.0 per cent confidence level, and (c) a groups by conditions interaction which was not statistically significant.

Figure 1 shows the mean days to criterion on both the original and reversal training. Statistical analysis of the data on days to criterion, using a mixed type analysis of variance design (as shown in Table 2), yielded (a) a difference between radiation groups which was significant beyond the 5.0 per cent confidence level, (b) a conditions (original training vs. reversal training) effect which was significant beyond the 1.0 per cent confidence level, and (c) a groups by conditions interaction which was significant beyond the 5.0 per cent confidence level.

2. *Delayed-Response*

Figure 2 shows the mean errors for each group on each condition of delay. Statistical analysis of the errors data, using a mixed type analysis of variance design, yielded no significant difference between radiation groups, no significant difference as a function of length of delay, and a nonsignificant groups by delay length interaction.

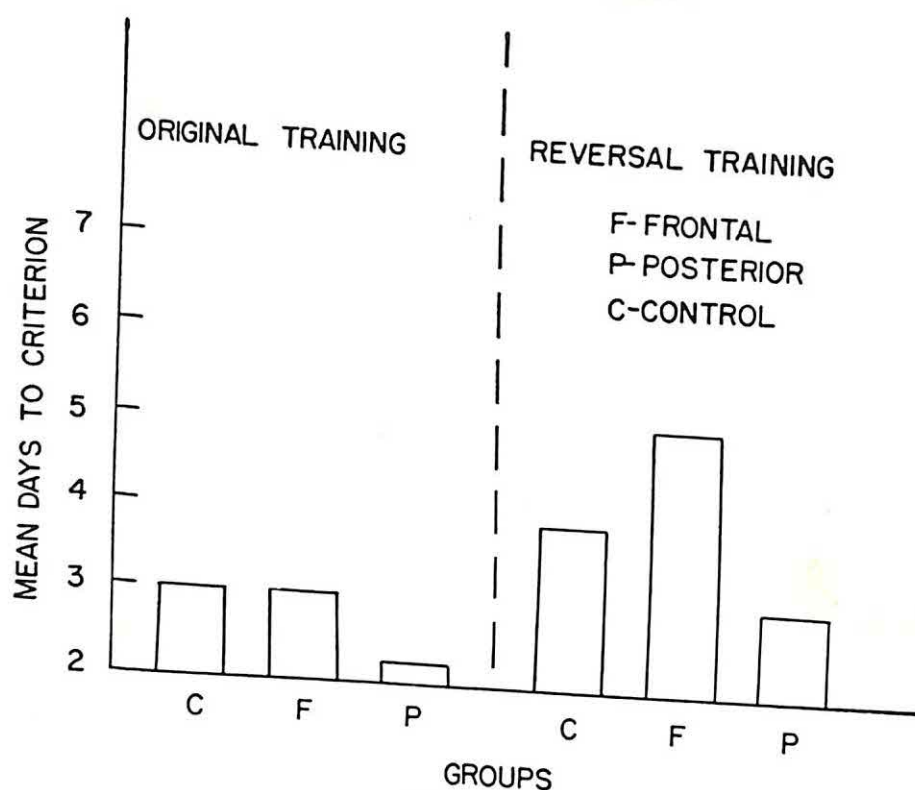


FIGURE 1
MEAN DAYS TO CRITERION FOR EACH GROUP ON BOTH THE ORIGINAL AND REVERSAL TRAINING

TABLE 2
ANALYSIS OF VARIANCE OF DAYS TO CRITERION

Source of variance	df	Mean squares	F	P
Between-subjects	14			
Between-groups (B)	2	3.01		
Error (b)	12	.74	4.06	.05
Within-subjects	15			
Conditions (A)	1	7.53		
A B	2	.58	68.45	.001
Error	12	.11	5.27	.05
Total	29			

C. DISCUSSION

The results reflect no differences between monkeys previously experiencing focal-head exposure to radiation and control monkeys in terms of errors to

criteria on an oddity-reversal problem requiring the utilization of the same stimulus cues in antagonistic response patterns. Errors to criterion on reversal learning did, however, increase significantly over errors to criterion on original learning.

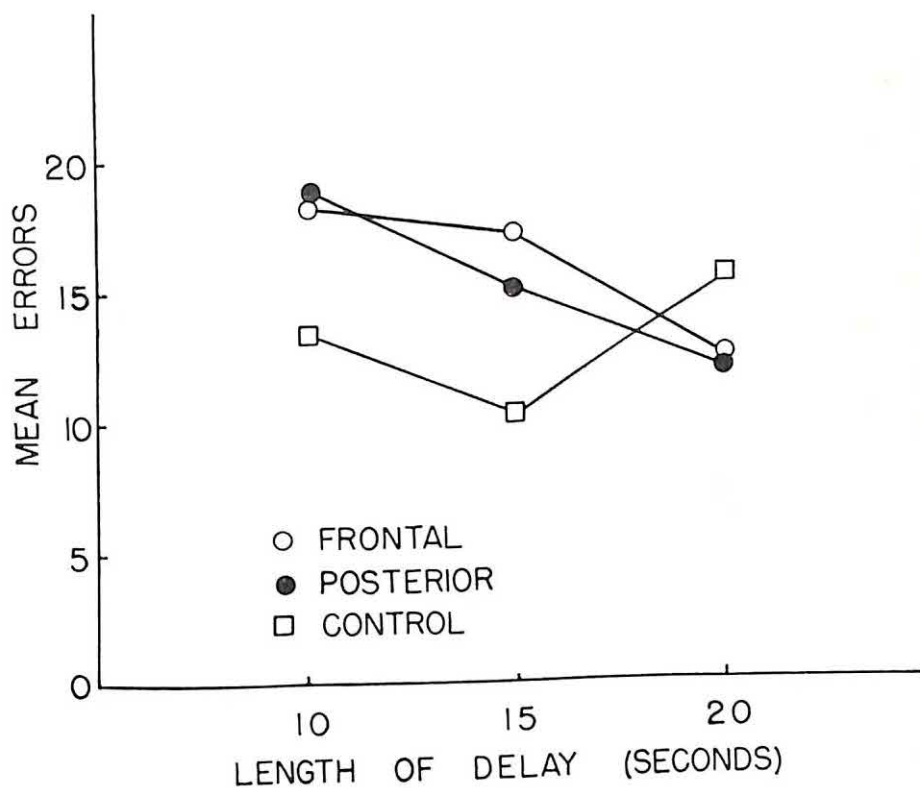


FIGURE 2
MEAN ERRORS FOR EACH GROUP ON EACH CONDITION OF DELAY

There was a significant difference between frontal irradiates, posterior irradiates, and control monkeys with respect to days to criteria on this problem, the frontal irradiates requiring the greatest number of days and the posterior irradiates the least. Days to criterion increased significantly during reversal training with the amount of the increase being greatest for the frontal irradiates and comparable for the other two groups. The significant groups by conditions interaction is interpreted as meaning that the amount of increase was significantly greater for the frontal irradiates than for either of the other two groups.

These findings are taken to mean that the frontal focal-head irradiated monkeys were less efficient in the utilization of the same stimulus cues in antagonistic response patterns than the control or posterior focal-head irradiated monkeys. This, in consideration of the results of Settlege, *et al.* (2) with the prefrontal operant, suggests neural tissue damage as a consequence of radiation exposure in the frontal focal-head irradiated monkey.

These same frontal focal-head irradiated monkeys showed no decrement on spatial delayed-response problems. Such results would not lead to a diagnosis of neural tissue damage.

The decremental performance of the frontal focal-head irradiated monkeys on one of the tasks of the present study, but not on the other, is amenable to several interpretations. It may, for instance, be the case that the brain areas associated with successful performance on these two tasks are differentially localized. A second possibility is that more neural tissue may need to be destroyed to produce decremental performance on delayed-response than to produce decremental performance on reversal problems. Another possible explanation might be that compensation of function with respect to delayed-response performance is greater than with respect to reversal problems. The issue can, of course, be resolved only by further experimental study. Whatever the ultimate resolution, the results of this study suggest a fruitful avenue of inquiry for further elucidation of the functions of the frontal lobes.

D. SUMMARY

Control monkeys and monkeys with previous focal-head exposure to X-ray radiation, some with irradiation of the frontal association areas and some with irradiation of the posterior association areas, were tested both on an oddity-reversal problem which required the utilization of the same stimulus cues in antagonistic response patterns for correct solution and on spatial delayed-response problems.

With respect to the oddity-reversal problem, a statistically significant increase in both errors and days to criterion on reversal learning over errors and days to criterion on original learning was found. The radiation groups differed significantly with respect to days to criterion, but not with respect to errors to criteria, the frontal irradiates requiring the greatest number of days and the posterior irradiates the least. A significant groups by conditions interaction was found in the days to criterion analysis. This interaction was interpreted as meaning that the amount of increase in days to criterion on reversal learning was significantly greater for the frontal irradiates than

for either of the other two groups. These results are diagnostic of neural tissue damage in the frontal focal-head irradiated monkeys.

With respect to delayed-response testing, no significant differences were found. These results do not suggest neural tissue damage in the frontal focal-head irradiated monkeys.

These findings are discussed in terms of their possible value for future study of the functions of the frontal lobes.

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THE INNER LIFE OF THE EXTREMELY GIFTED CHILD, AS SEEN FROM THE CLINICAL SETTING*¹

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For some years now, the personality of the extremely "gifted" child has been surrounded with an aura of scientific "gospel" which stems largely from the monumental research of Terman and others (Terman & Oden, 1947); research which showed the gifted child to be as well, if not better adjusted than the average child. The data which has accumulated in the course of the past 20 years has consistently and overwhelmingly presented the gifted child as healthier, stronger, more sociable and more creative than the average child (Miles, 1954). Indeed, the studies present him as a "paragon" of all virtues.

Clinicians today, however, are not finding evidence to support the conclusions of Terman, et al., regarding the extremely gifted child. In fact, clinical observations tend to disagree with some of the basic concepts of the extremely gifted child which have, for some time now, been almost universally accepted. Some of these observations are described in this paper. They are presented here in strictly hypothetical form, unprotected by such professional armor as chi squares, t's, and rigorous statistical tables. Nevertheless, since they are the deductions of trained clinical observers, they may be worth perusal at this time, even though they may be either substantiated or disproved by research data at a later date.

So that the terms of reference will be clearly understood and defined, an extremely gifted child, within the framework of this paper, is one who has an IQ of at least 150 and who is also creative. Right here, within the definition of "giftedness" may be the basis for some significant discrepancies between the current clinical observations and the conclusion of previous research. For some time, this author has felt that Terman's studies were based upon inadequate definitions of the extremely gifted child or "genius," as he described him (Terman & Oden, 1947). Terman's sample may also have been a biased one which would make his results valid, not so much

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for the gifted child upon whom they were ostensibly based, but rather for the socio-economic group, or perhaps subculture, from which his sample was selected. One might infer, similarly, that the clinical sample used in our observations and from which our hypotheses are drawn is also not a representative one. This may very well be the case, and we are fully aware of this possibility. However, the rationale behind our analysis is quite different. For our purposes, it is not impossible to get insights into the working of the normal mind, even from an observation of the morbid.

It is generally agreed that the extremely gifted child is one who, through some fortuitous set of circumstances, has acquired a superior nervous system. Because of the superior equipment with which he has been endowed, he is able to perceive quickly the world around him; to respond to minimal stimulation; to organize and compare the rich experiences his sensitivity invites and, through both inductive and deductive processes, to generally derive at pertinent generalizations. Left to his own rich store of curiosity, and even without adult "prodding," he is constantly reevaluating his environment, finding new aspects of it and reorganizing the set patterns of his familiar world into new "gestalts." It is this talent or skill which many of the extremely gifted children have for seeing new relationships in old or familiar settings or for taking that "wonderful new look at things," which is probably responsible, to a large degree, for some of our major discoveries.

Because of his superior nervous system, the extremely gifted child usually has little tolerance for humdrum experiences but must almost always seek new and wider ways of experiencing, thinking, willing, and apperceiving the sensations and nuances of living. Since the extremely gifted child responds to his environment differently and more rapidly than the average child, it is usually more difficult for the adult to fathom his inner life, know what motivates him, comprehend his reactions, or understand "what makes him tick," as anyone who has lived with or worked with such children can attest. This does not mean, however, that he can escape from the environment by which he and every other child is largely fashioned.

The unusual talents, skills, and abilities of the extremely gifted child are a double-edged sword which do not make life any easier or pleasanter for him than for those around him. There are even more pitfalls on the road to maturity for the extremely gifted child than for the average child. Because he is quick to perceive minimal stimuli, he is enabled and apt to perceive unconscious hostilities which might go unnoticed by the average child. One can compare this sensitivity to the behavior of an enraged bull

in a china shop. This may come about because of the rejection and hostilities of his peers and family who resent the way in which he belittles their stupidities and inanities. On the other hand, if the extremely gifted child becomes aware of the effect of his behavior on others and the fact that it is considered aggression, he may develop a fear of displaying his understanding and withdraw into fantasy. Since reality is painful, he may not even subject his fantasy world to the test of reality. His creative abilities then serve to fashion a world for himself alone or to indulge in autistic thinking. In this chain of action-reaction patterns, the extremely gifted child may develop aggressions, which he may never learn to handle, toward the people who are rejecting him, generally those who are close and loved, and upon whom he depends for care and support. He, thus, becomes afraid of his own aggressive drives, and does not learn to dissipate these aggressions by expressing them toward those who may tolerate them rather than toward those upon whom he depends for care and support. Therefore, we may find quite frequently that the extremely gifted child's acute sensitivity and awareness of the world leads to his perception of the general hostility of the environment eventually apperceived as directed toward himself. From this may develop the beginnings of a nuclear neurotic process occasionally typified by odd, queer, and even bizarre behavior and creations.

We must also realize that the extremely gifted child, by the very fact of his being gifted, is alone. He is "an island within." Because society has special expectations for the extremely gifted child, he will very often be separated from his group, assigned special roles, and given differential treatment. These are questionable advantages for him since they are likely to bring so many concomitant difficulties in their wake. Statistically, as less than one-tenth of a per cent of the population, circumstances may prevent the extremely gifted child from meeting many of his own kind whom he would find both stimulating and enjoyable company. In addition, we are prone to overlook the fact that even within the tiny segment of the population which they represent, there is no homogeneity. They come from backgrounds with different cultural, racial, family, and language patterns where the expectations and goals of society for these children are widely divergent. Loneliness may also be the lot of the extremely gifted child because, no matter how many classes he attends, no matter how many people he knows, and regardless of how many ordinary, humdrum activities he may participate in, he rarely finds, in any group, much needed acceptance, understanding, or support of his differences.

And there are still more factors which contribute to the "aloneness"

of the extremely gifted. These children soon realize that they can perceive and understand the consequences of actions long before their contemporaries but usually are met with anything from indifference to hostility when they try to communicate these insights, deductions, and conclusions. Able to see so much better the pitfalls which await him at the turn or fork in the road, the extremely gifted child cannot understand the "blindness" of his contemporaries or their rejection of his offered information. Faced with what may begin as an involuntary isolation, the extremely gifted child sometimes glorifies this situation and gets pleasure as well as pain from his "splendid" withdrawal. He may begin to fantasy as to the ultimate fruition of his abilities. He will try to get as much narcissistic gratification as possible from the awareness of his own uniqueness and from the adulation of a small, "elite" group of people with whom he will try to surround himself. And, in the course of this defensive exclusiveness, he will produce further antagonism among those who will look upon him as an intellectual snob—or "egghead."

Despite appearances, there is a constant and persistent soul-searching, self-evaluation, and devaluation in which the extremely gifted child engages. He is not likely to compare his abilities and achievements with those of his contemporaries which would present him in a favorable light, but rather he is prone to look at himself in relation to the great men and women of the past with whose accomplishments his own can only compare unfavorably. Such continuous morbid introspection can and does lead to feelings of inferiority and dejection. Because he sets for himself goals that are beyond his reach, he assumes that others will also. This, in turn, induces such fear of his inadequacy in meeting the expectations of others, that he may choose to feign incompetence in the hope that less will be expected of him. But even his "failures" will be viewed in a different light from those of the average child, and again he is likely to be singled out for special attention as an "under-achiever." It would appear that, in many cases, regardless of the course of action taken by the extremely gifted child, he is still alone. Even if he succeeds, he is faced with the special kind of solitude which accompanies success, but at least he gets ego satisfaction through success experiences.

In some parents, an extremely gifted child produces feelings of inferiority. It is not uncommon to hear "I wish my child was average, just like everybody else." Irritated by the child's lack of interest in the current banter and interchange in the family, these parents are unable to provide the child with more stimulating experiences. The extremely gifted child, partly cut

off from family life, feeling somewhat disappointed and therefore rejected, may develop feelings of inferiority and by reaction formation, feelings of superiority, and withdraw from the family. Sometimes he may try to adjust by developing special abilities. These special abilities meet a welcome accolade among his associates. He may also busy himself in humdrum activities. He may show the world a mask of adjustment beneath which there is a seething sea of discontent. In order to adjust to the group, the extremely gifted child will thus tend sometimes to repress his own interpretation of experiences so as not to arouse anxiety and animosity. This quite often will mean, in turn, a restriction of the functioning of the child, a blunting of his concept of reality, and his becoming a shallow, ineffectual figure. The extremely gifted child will try to stop seeing, thinking, and feeling, if these do not go along with the desires of the majority. When these conditions prevail, he will lose all spontaneity, will become afraid of original thought and tend to chew over and summarize the achievements of the past rather than create new things on his own.

According to some research findings creativity depends upon a "receptive attitude toward new ideas," "sensitivity to problems," "conceptual foresight," etc. (Guilford, 1959). These, it seems to us, can only come about when the person is free to create either because his creative efforts find a welcome accord in his family or community or because he has freed himself from the fetters of the world and can create in spite of them.

We here may also possibly discover the reason why so many extremely bright children, IQ-wise, are not creative when they grow up but just imitate the work of others. This may also be due to the fact that, creativity was criticized whereas parroting of useful or useless information was heartily approved. In other words, anything that went along with the preordained world of the classroom and followed the teacher's time hallowed practices, was approved and accepted.

On the other hand, parents may develop a feeling of superiority because of the extremely gifted child whom they find in their midst. He is like the goose that lays the golden eggs. Immediately the parents think and feel about social advancement for themselves, sometimes forgetting about their child in the process. They can lord it over their friends and neighbors with their child's report card or the six prizes he received at graduation. The child is thus "enslaved" with the responsibility of providing the family with "prestige." His accomplishments are no longer his—they are his parents and he is left alone, his accomplishments exposed to the winds of envy which he feels directed towards him from every quarter. He develops a warped

self-concept. In order to protect himself against hurt from friends and associates, he may develop various neurotic characteristics, in the form of a character neurosis.

In conclusion, it must be reiterated that, from the vantage point of the clinician, the "gift" of the "extremely gifted" is indeed a questionable one. Our observations have indicated that generally the superior intelligence of the extremely gifted child is of little help to him in solving his problems. Neither can he receive help, in most cases, from his not so gifted parents and contemporaries, who see his problems in the light of their own needs rather than his. Caught up in the dilemma of his own disparate intellectual and emotional maturity, the extremely gifted child is occasionally pushed through prolonged frustration and increasing aggression toward himself, even to the point of self-destruction. Due to his extreme sensitivity and keen perception, he sees the world in a new light and, due to the animosity of his environment, he is often in a state of intrapsychic disequilibrium. But he does have the potential for developing new insights into age-old problems, for creating new ideas and theories and perhaps, in so doing, solving some of his own problems.

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THE EFFECTS OF RELATIVELY MASSED AND SPACED
ELECTROCONVULSIVE SHOCK ON CONCURRENT
RUNWAY PERFORMANCE IN THE MALE
ALBINO RAT*¹

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The work of a number of investigators (Braun & Patton, 1950; Braun, Russell & Patton, 1949 a, b; Russell, 1949) indicates that a series of electroshock convulsions has little or no effect on the acquisition and retention of such simple tasks as T-maze or straightaway performance. However, the responses selected were usually such gross measures as latency scores total time in maze or number of errors in the maze. Preliminary experiments at this laboratory have produced a number of more refined response measures of simple runway performance which significantly discriminate the behavior of convulsed from that of control animals. In a previous study (McDonald & Stern 1958) in which the effects of 5 vs. 15 ECS were compared it was found that the 15 ECS group was significantly different from both a 5 ECS and a control group on these measures. The present study differs from the earlier one in that only one runway trial was given per day (vs. 2), in that runway trials extended longer after the last convulsion (30 vs. 5 days), and in that the parameter of "spaced" vs. "massed" ECS was explored. Since a series of five ECS administered at the rate of one per day caused a minimal disruption of runway performance we chose to test a somewhat longer series of convulsions.

A. METHOD

1. *Subjects*

Forty-nine, 83-day-old male albino rats of Sprague-Dawley strain were divided into four groups as follows: Group I, a 16 ECS group which received one shock per day for 16 days ($N = 14$); Group II, an eight ECS group which received one shock per day for eight days with pseudoshock for an additional eight days ($N = 12$); Group III, a spaced eight ECS

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¹ This research was supported by a contract between the Office of Naval Research and the Washington University School of Medicine.

group which received one shock every other day for 16 days and pseudo-shock on alternate days ($N = 13$); and Group IV, a control group which received pseudoshock for 16 days ($N = 10$).

2. Apparatus

The runway is a $12' \times 7'' \times 5''$ enclosed structure with four photo-electric cells located equidistant from each other. These checkpoints are connected to a polygraph which records total time in the runway, number of times the animal interrupts each checkpoint, and the amount of time spent at and between checkpoints. Remote controlled guillotine doors separate both the starting- and goal-box from the runway proper. The goal-box door which is flush with checkpoint four was closed when the animal entered and began drinking. A food dish containing diluted sweetened condensed milk was present in the goal-box on every trial.

3. Procedure

a. Preliminary training and handling. The animals were placed on a 23 hour water deprivation schedule eight days before preliminary training and 13 days before the experiment proper was initiated.

In order to accustom the animals to being handled and to keep handling uniform, all were weighed immediately after receiving their daily one-hour water ration. Weighing began one week before they were placed on the deprivation schedule. Training procedures began eight days after initiation of the deprivation schedule after animals had adapted to this schedule and were again showing weight gains.

Before initiating the experiment proper, all animals were given introductory trials in the runway, two per day for five days. For the first three days of preliminary training, each animal was placed individually into the goal-box facing the guillotine door, and the amount of time taken for the animal to turn around and begin drinking was recorded with a stop-watch. On the fourth and fifth days of preliminary training, the runway was blocked off so that only the last third was accessible and the guillotine door was raised. The animal was placed into the runway at the block, and the time taken to begin drinking was recorded as well as a rating of the animal's response to the closing of the guillotine door. An interval of at least 10 minutes elapsed between successive trials for any one animal. Each animal was allowed to drink from 10 to 15 seconds before its removal from the goal-box.

b. ECS procedure. The current used for convulsing animals was 58ma.

delivered for 0.2 seconds through the ears. Good electrical contact was insured through the use of electrolytic jelly. The apparatus was identical to that previously described (Stern, 1956). The procedure for pseudoshock was identical except that no current was passed through the electrodes. All convulsions were administered in a room different from that in which animals received training.

c. Runway training. Runway trials for the experiment proper began on the day after the last day of preliminary training. ECS or pseudoshock was administered four to five hours after the runway trial and was initiated concurrent with runway training. Thus, Group I received 16 ECS concurrent with runway trials, the runway trials extending 30 days after last ECS. Group II received eight ECS concurrent with runway trials, followed by eight days of pseudoshock with runway trials extending 30 days after last pseudoshock. Group III received ECS and pseudoshock on alternate days with runway trials extending 30 days after last pseudoshock. Group IV received 16 pseudoshocks with runway trials extending 30 days after last pseudoshock. All animals were given one trial per day in the runway over a period of 46 days.

The runway trials were conducted as follows: Each day the animal was placed into the goal-box prior to first exposure to the runway, and the time required to begin drinking was recorded (time to drink measure). The animal was permitted to drink for 8-10 seconds and was then introduced into the starting compartment. The starting-box gate was opened 15 seconds after the animal was placed into the starting-box and was closed after the animal had entered Checkpoint 2. A seven-point rating scale was used to evaluate each animal's behavior at the entrance to the goal-box (entrance to goal-box rating). The rating scale scores were based on the following criteria: (1) no hesitation whatsoever at the entrance and enters goal-box immediately, (2) minimal hesitation or exploration of entrance (1-2 seconds) but enters box freely; (3) significant hesitation (2 seconds or greater) but enters box freely; (4) significant hesitation and enters box cautiously; (5) approach-avoidance like behavior regardless of time consumed; (6) approach-avoidance like behavior and animal retraces to or past Checkpoint 3; (7) animal never reaches Checkpoint 4 during a trial. (If an animal did not enter goal-box and begin eating within five minutes it was removed). The reliability of this scale has previously been reported on (McDonald & Stern, 1958).

B. RESULTS

Since the data did not meet the assumptions necessary for the use of parametric statistics, Mann-Whitney "U" Test analyses were made. Statistical

Comparisons were made on the following measures: time to drink, total runway vacillation, and entrance to goal-box ratings. A graphical analysis was made of the per cent of animals exhibiting the "startle response." A "startle response" was recorded when an animal retraced to the starting-box in response to the closing of the starting-box door. This door was closed after the animal had passed Checkpoint 2 in the runway. Since the closing of the starting-box door as well as the animals' entrance into the checkpoint produced a signal on our recording apparatus this measure was not dependent on the subjective impression of the experimenter but could be objectively evaluated.

1. *Time to Drink Measure*

The time to drink measure consisted of the time elapsed between the introduction of the animal into the goal-box (facing the guillotine door) and its initiation of drinking. This measure was obtained with a stopwatch. All groups reached the reward within four seconds on the first three training trials. The control group showed a further consistent decrease in time to reach the reward which leveled out and at about one second after 22 runway trials. The 16 ECS group was significantly different from the control group by Trial 5 or after four ECS and remained consistently slower than the control group through Trial 34, or for 18 days after last convulsions. (Of the 30 comparisons made during this period 11 were significant beyond the .01 level and these all occurred between the 6th and 19th trial, 16 were significant beyond the .05 level, i.e., between .02-.05 level, three between the .05-.10 level). In this and all subsequent statistical evaluations the period during which significant differences are reported is demarked by the finding of two consecutive significant differences and terminated when three consecutive trials of no statistical differences make their appearance. (The tables on which these evaluations are based can be obtained from the author.) The eight ECS group (daily) became differentiated from the control group at the same time as was true for the 16 ECS group but could only be significantly differentiated from the control group through Trial 11, or three days after their last convulsions. (Of the seven comparisons made during this period five were significant beyond the .01 level, two beyond the .05 level.) The animals subjected to a series of eight convulsions on alternate days became significantly differentiated from the control group by Trial 11, or after five convulsions, and maintained this difference until Trial 19, or until three days after last convulsion. (Of the 12 comparisons made during this period three were significant beyond the .01 level, six beyond the .05 level,

one at the .08 level, and two not significantly different from chance.) Thus, whether convulsions are administered daily or on alternate days, five convulsions are necessary before this effect appears.

Neither eight convulsions administered at the rate of one per day or an

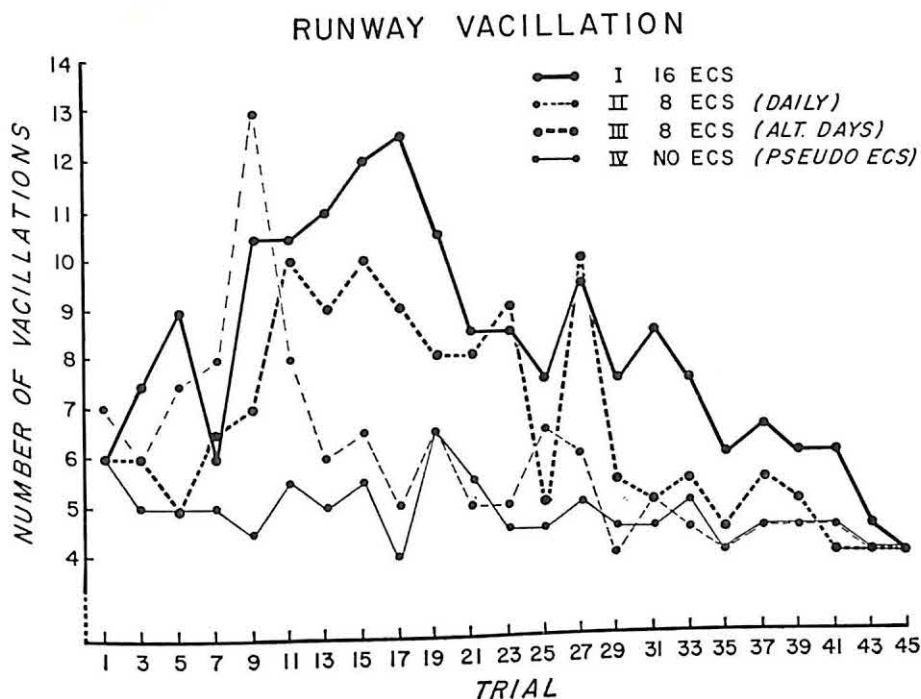


FIGURE 1

alternate day has any lasting effect on time to drink, in both cases significant differentiation between these and the control group lasted no longer than three days after last convulsion, while in the case of the 16 ECS group the effect was observed for at least 18 days after last ECS.

2. Vacillation

The measure of vacillation was a count of the number of times an animal interrupted the light beam of the photo-electric cells prior to its first entrance into the goal-box. Thus, the lowest amount of vacillation an animal could show on any one trial was four. We see that the 16 ECS group increases in vacillation throughout the period of ECS administration and stays above the level shown by control animals throughout the experiment. Statistical eval-

uations show significant differences between this and the control group starting with day four through day 42. Of the 39 comparisons made during this period 25 were beyond the .01 level of confidence, five beyond the .05 level, two beyond the .10 level, and seven not significantly different, these occurred on Trials 7, 25, 26, 32, 34, 38, and 39.

The group subjected to eight ECS (one per day) was significantly different from the control group starting on Day 2 through Day 10. Of the nine comparisons made during this period two were significant beyond the .01 level, four beyond the .05 level and two beyond the .10 level and one not significantly different, this occurred on Trial 6.

The group subjected to eight ECS (alternate days) could be differentiated from the control group from Day 6 through Day 30 (of the 25 comparisons made 10 were significant beyond the .01 level, eight beyond the .05 level and four beyond the .10 level, and three not significantly different, these occurred on Trials 11, 24, 29).

Comparisons between the three ECS groups shows the 16 ECS group differentiating from the eight ECS (daily) group after Trial 11 through Trial 4. Of the 31 comparisons made during this period 18 were significant beyond the .01 level, nine beyond the .05 level, two beyond the .10 level, and two were not significantly different, these occurred on Trials 34 and 38. Comparing the 16 ECS with the eight ECS (alternate day) group significant differences are observed between Days 29 and 33. Of the five comparisons made one was significant beyond the .01 level and four beyond the .05 level.

Significant differences were observed between the two eight ECS groups from Day 12 through 29. Of the 18 comparisons made 10 were significant beyond the .01 level, three beyond the .05 level, two beyond the .10 level, and three were not statistically significant—Trials 22, 24, 28.

3. *Startle Response*

As earlier described the "startle response" was recorded when an animal retraced to the starting box after it had entered into the second checkpoint. We have called this response a "startle response" on the basis of our observation of the animal's behavior to the sound of the closing door. The closing of the starting box door made an audible click in response to which some animals returned to the starting point. It is this bit of behavior which we have labeled the "startle response." Figure 1 depicts this response for the various groups and indicates that Groups I and III behave similarly in that more of these animals exhibit the response and exhibit it for a longer period of time than was true for either the control or eight daily ECS groups. The

latter group shows the effect during the period of ECS administration but shortly thereafter returns to a level comparable to that of the control group. The other two ECS groups exhibit a more severe, as well as a much longer lasting effect.

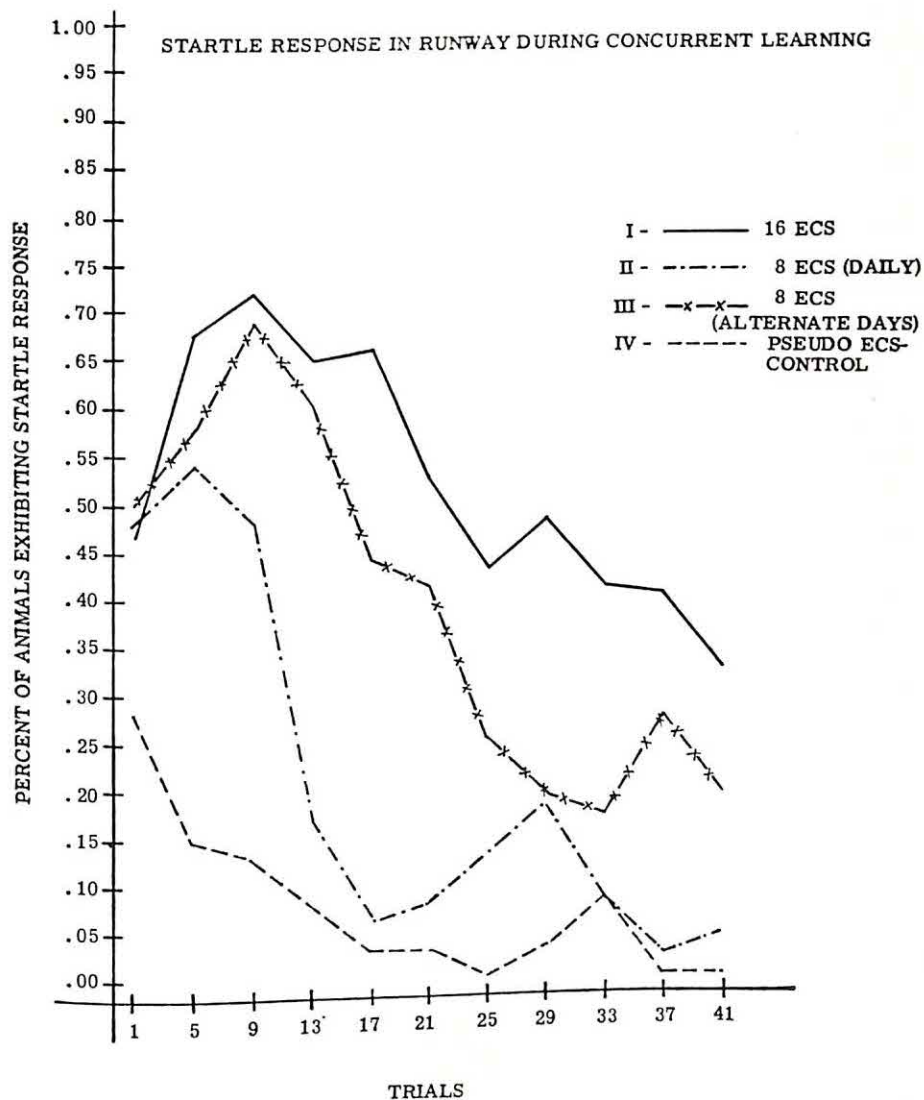


FIGURE 2

4. *Entrance to Goal-Box Rating*

The rating scale previously described was used to evaluate this aspect of the animal's behavior in the runway. The 16 ECS group was differentiated from the control group between Day 12 and Day 23. Of the 12 comparisons made in this period two were significant beyond the .01 level, five beyond the .05 level, one beyond the .10 level, and four were not statistically significant—14, 16, 20, 22.

The eight ECS group (daily) was differentiated from the control group from Day 7 through Day 9 (of the three comparisons made in this period one was significant beyond the .01 level, one beyond the .05, and one beyond the .10 level). The eight ECS group (alternate days) was differentiated from the control group from Day 12 through 24 (of the 13 comparisons made during this period one was significant beyond the .01 level, one beyond the .05 level, and six beyond the .10 level, with five comparisons not significantly different—Trials 13, 14, 17, 19, 20).

A comparison of the 16 with the eight ECS (daily) groups indicates that the latter quickly returns to goal-box approach behavior similar to that of the control group. From Day 12 through Day 25 this group is differentiated from the 16 ECS group (of the 14 comparisons made during this period one was significant beyond the .01 level, eight beyond the .05, and two beyond the .10 level with three comparisons not significant—Trials 16, 22, 24).

Comparing the eight ECS groups (daily vs alternate days) shows the latter to behave more like the 16 ECS group. Significant differences were obtained between the two groups between Trials 12 through 26. Of the 15 comparisons made one was significant beyond the .01 level, two beyond the .05 level, five beyond the .10 level with seven not significant—13, 15, 17, 19, 20, 22, 23.

C. DISCUSSION

Our results indicate that convulsed animals behave differently from control animals in a simple runway problem when training is initiated concurrent with the convulsive schedule. The differences in performance may be considered from the standpoint of the following four hypotheses in vogue in interpreting the findings of experiments showing a decrement in learning or retention as a function of ECS: (1) The motivation or drive level of the ECS animals was lower than that of the PS animals. (2) The ECS animals were more debilitated than the PS animals. (3) Convulsions completely obliterated learning which was not sufficiently consolidated prior to treatment. (4) The ECS animals learned to make responses different from those of

the PS animals because they respond to a wider range of cues in the apparatus.

The results of the present investigation neither support nor refute the possibility that a motivational decrement occurs in convulsed animals. Such a decrement is however not related to the drive manipulated in the present experiment (thirst, and to a lesser extent hunger) since we have previously shown that animals maintained on a deprivation schedule identical to the one employed here show no difference in weight gain when compared to control animal (Stern, 1954). Bernberg (1951), Mirsky, Looney, & Rosvold (1954), using hunger motivation indicate that ECS does not diminish hunger drive. Thus motivational decrements relevant to the drives being manipulated do not appear able to "explain" the observed differences in behavior between convulsed and control animals.

Several findings of the current investigation run counter to an interpretation within the "debilitation hypothesis" framework. The fact that the ECS animals were not debilitated following convulsions is borne out first by their greater vacillation in the runway. Thus differences in amount of time to traverse the runway were not a function of ECS animals running more slowly, but could be attributed to their covering more distance because of the vacillatory behavior described. It could be said that their increased time scores on the Time to Drink measure may be accounted for on the basis of muscular weakness. However, we observed that when an ECS animal was placed in the goalbox, most of its time was spent facing the goalbox door. Once it turned around, its progress to the reward was indistinguishable from that of control animals.

The "anti-consolidation" hypothesis of Duncan (5) cannot account for the findings either. Duncan has suggested that a short rest interval must intervene between training and the initiation of convulsions in order for the results of training to be "consolidated." However, if the first convulsion was delayed for at least an hour, memory impairment did not occur. In the current investigation, the interval between convulsing and training was at least four hours. Furthermore, if the temporal interval between training and convulsions were a crucial determinant, it would be expected that the spaced eight ECS group would show less impairment in runway performance than the massed eight ECS group since they received training trials without convulsions on alternate days. However, the reverse was found to be true in the current investigation. Group II was consistently more similar to the control group, and Group III was consistently more similar to Group I. This finding argues equally well against the "debilitation" hypothesis.

The fourth hypothesis, that ECS animals respond to a wider range of cues in the experimental situation than is true of controls seems to be most tenable in the light of our findings. The ECS animals, particularly Groups I and III, showed more retracing when the starting-box door, which made a slight click, was closed. Thus auditory cues to which control animals rapidly learned not to respond were reacted to for a much longer period by the ECS animals. The ECS animals may have responded to other seemingly unimportant stimuli to which the PS animals were unresponsive. For example, the pens of the recording unit which was adjacent to the goal-box, made a click whenever the animal passed a checkpoint. Thus the approach-avoidance like behavior shown by some of our convulsed groups could be attributed again to their responding to auditory cues which interfered with optimal performance in the runway. The control animals quickly learned to ignore such cues while experimental animals persisted in responding to them.

These findings suggest the hypothesis that ECS animals learned responses in the runway which were different from those of the control animals. By virtue of their responsiveness to either a wider range of stimuli or a decrease in the speed of extinguishing their response to such stimuli, the ECS animals may have been responding to stimuli other than those on which the experimenters were specifically training them thus showing impaired performance on the runway.

Our observations to date indicate that auditory stimuli are thus responded to. Other sense modalities may well be similarly affected and will, in future experiments be explored as factors important in demonstrating impaired performance of convulsed animals. Our hypothesis thus is one which does not stipulate that there is an impairment either in learning ability or memory but that convulsed animals are "learning more," some of this learning being detrimental to optimal performance of a given task, or that convulsed animals adapt less quickly to stimuli which are irrelevant to the task experimenter wants them to learn.

D. SUMMARY

The present study presents data showing that convulsed animals can be significantly differentiated from control animals through their behavior in an enclosed runway. Three groups of convulsed animals, 16 ECS (one per day), eight ECS (one per day), eight ECS (alternate days), and a control group (pseudoshock) were given one trial of runway exposure for 30 consecutive days. Runway training was started concurrent with the initiation of the convulsive schedule, with at least three hours intervening between the runway

trial and the convulsion. Significant differences in behavior on time to drink, "startle response" in the runway, approach to goal-box and vacillation in the runway were found between convulsed and control animals. Most severely affected were the 16 ECS group, closely followed by the eight ECS (alternate day) group, with the eight ECS (daily) group showing only short-lived and transitory changes. It is suggested that the learning and retention of convulsed animals is hampered by their hyper-responsiveness to "extraneous" stimuli in the experimental situation to which control animals either do not respond or quickly adapt.

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A DEVELOPMENTAL STUDY OF CHANGES IN BEHAVIOR UNDER DELAYED AUDITORY FEEDBACK*¹

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Delayed auditory feedback (DAF) refers to an experimentally induced delay in the air-conducted return of a speaker's vocal output to his ears. Delayed auditory feedback of speech results in marked and characteristic changes in speech, consisting primarily of an increase in mean vocal intensity, an increase in the time taken to utter words and parts of words, and a tendency to repeat parts of words. A sizeable literature is available concerning the changes in speech under DAF (3).

The problem of the present investigation was to determine: (a) whether age is related to the degree and kind of changes which occur in speech under delayed auditory feedback, (b) whether age is related to the attitude of the child toward the experience of speaking under delayed auditory feedback.

A. METHOD

1. *Subjects and Procedure*

Eight to 10 children at each age between four and nine years were randomly selected from a suburban summer day camp population. There were about five boys and five girls in each group. All subjects had normal speech and hearing.

Each child was asked to "draw a person." PDR-8 earphones with MX/41 AR cushions were then placed on the child's ears and an Electrovoice 647

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dynamic microphone was placed at a constant three-inch distance from his mouth by fixing it to an adjustable metal bridge attached to the headset frame. The child was then asked to tell a story about the drawing. His vocal output was amplified, and returned to his earphones. This condition approximates synchronous feedback of speech. The child's speech was simultaneously recorded on magnetic tape using a Concertone model 1401 tape recorder. Upon completion of the story, the experimenter asked the child the following questions: "Whose voice did you hear?" "Where was it coming from?" "Did you like the sound of it?"

The child was then asked to tell another story about his drawing. This time the amplified auditory feedback of his speech was delayed 200 milliseconds before being returned to his earphones, the record and playback heads of the tape recorder functioning simultaneously to produce the delay. The details of this technique have been described elsewhere (2).

After the child finished telling his second story, the questions asked after the first story were repeated, and the following additional questions were asked: "Did your voice sound different from before?" "What was different about it?"

2. Analysis

The complete story told by the subject under each condition of the experiment was recorded on magnetic tape and used as his speech sample. The following measures were obtained for each speech sample:

1. Number of words in the speech sample. Repetitions were not counted.
2. Number of syllables in the speech sample. Repetitions were not counted.
3. Number of intrusions in the speech sample. All utterances such as "uh" and "um" were counted.
4. Time in seconds to produce the speech sample. Pauses longer than six seconds were not included in this time measure.
5. Number of words in the speech sample which were repeated. This should not be confused with the number of repetitions. Several repetitions of the same word were counted as one repeated word.
6. Number of syllables in the speech sample which were repeated. Several repetitions of the same syllable were counted as one syllable repeated.
7. Number of syllables in the speech sample which were prolonged. An example of such a prolongation would be the pronouncing of "man" as "maaaan." Small changes which could not be reliably judged were not included.

Since we are dealing with impromptu speech, the speech samples were of varying lengths. The range of the number of words in the speech samples for the control condition was 29 to 517 with a median of 88.5 (Table 1). The time taken to produce each control sample ranged from 16 to 230 seconds with a median of 53.5 seconds. These differences in size of speech

TABLE 1
MEDIAN AND RANGES OF SCORES FOR YOUNGER CHILDREN, OLDER CHILDREN,
AND TOTAL GROUP UNDER CONTROL AND DELAYED AUDITORY FEEDBACK

		Control		DAF	
		Mdn.	Range	Mdn.	Range
Number of words	Younger	68	29-517	71	24-273
	Older	99.5	36-440	55	20-158
	Total	88.5	29-517	56	20-273
Number of syllables	Younger	83.5	36-543	81	29-299
	Older	111	46-510	64	24-191
	Total	104	36-543	67.5	24-299
Number of intrusions	Younger	1	0-14	1	0-11
	Older	2	0-41	0	0-6
	Total	1	0-41	0	0-11
Time in seconds	Younger	51.5	16-230	85	27-355
	Older	57.5	27-178	66	26-243
	Total	53.5	16-230	69	26-355
Number of words repeated	Younger	0	0-3	1	0-9
	Older	.5	0-4	1	0-5
	Total	.5	0-4	1	0-9
Number of syllables repeated	Younger	0	0-4	4	0-15
	Older	0	0-3	5	0-17
	Total	0	0-4	4	0-17
Number of syllables prolonged	Younger	1	0-6	18	3-215
	Older	0	0-4	20.5	0-69
	Total	0	0-6	19.5	0-215

Younger children 4-6 years; N = 26. Older children 7-9 years; N = 28. Total group, N = 54.

sample required the use of ratio scores for evaluation of the data. The ratios used were:

$$A. \text{ Word rate} = \frac{\text{Number of words}}{\text{Time in seconds}}$$

$$B. \text{ Percentage of words repeated} = \frac{\text{Number of words repeated} \times 100}{\text{Number of words}}$$

$$C. \text{ Percentage of syllables repeated} = \frac{\text{Number of syllables repeated} \times 100}{\text{Number of syllables}}$$

$$D. \text{ Percentage of syllables prolonged} = \frac{\text{Number of syllables prolonged} \times 100}{\text{Number of syllables}}$$

$$E. \text{ Percentage of intrusions} = \frac{\text{Number of intrusions} \times 100}{\text{Number of words}}$$

Because of the number of zero scores, tied scores, and non-normal distributions, all results were analyzed by non-parametric techniques.

B. RESULTS

Table 2a contains the scores of speech alteration measures for the total group. As reported widely in the literature, a delay in auditory feedback causes marked changes in articulation. All subjects showed a slowing of their speech, and all but one increased the percentage of syllables they prolonged. Most of the subjects increased the percentage of repeated words and syllables. Slightly more of the subjects showed a decrease in the percentage of intrusions under DAF.

TABLE 2a
MEDIAN AND QUARTILE DEVIATIONS ON SPEECH MEASURES FOR TOTAL GROUP
UNDER CONTROL AND DAF

	Control		DAF	
	Md.	Quart. dev.	Md.	Quart. dev.
Word rate	1.77	.45	.77	.15
Percentages of syllables prolonged	0	.3	24.6	8.6
Percentage of intrusions	1.4	1.9	0	1.6
Percentage of words repeated	0	.7	2.2	1.8
Percentage of syllables repeated	0	.5	4.7	2.7

TABLE 2b
CHANGES IN SPEECH MEASURE SCORES UNDER DAF

	Increase	Number of individuals Decrease	No change
Word rate	0	54	0
Percentage of syllables prolonged	53	0	1
Percentage of intrusions	14	25	15
Percentage of words repeated	36	9	9
Percentage of syllables repeated	45	3	6

The largest alterations in speech under DAF were in the percentage of syllables prolonged (Table 2a). The increase in this measure from a median of 0 per cent of the syllables prolonged under synchronous feedback

to a median of 24.6 per cent of the syllables prolonged under DAF. The word rate decreased by more than half under DAF. However, only 2.2 per cent of the words and 4.7 per cent of the syllables uttered under delay were repeated.

To study the effect of age on these speech changes, we divided our group into the younger children from four through six years ($N = 26$) and the older children from seven through nine years ($N = 28$). (Tables 1 and 3). Table 3 gives the medians, quartile deviations, and significance of the differences between the scores for younger and older children on our measures. The difference scores shown were computed by subtracting each individual's score under the control condition from his score under DAF.

The older children spoke more rapidly under the control condition than did the younger children ($p < .01$). However, the effect of delay was to slow down both groups and also to eliminate differences in rate between the two age groups. Since the speech of the older children had been faster under control, their speech was slowed down more by DAF than was the speech of the younger children, resulting in a highly significant discrimination of the two groups on the difference scores ($p < .001$).

The younger children prolonged syllables more than the older children even under the control condition. Under DAF there was a great increase in the percentage of syllables prolonged by both groups: from a median of 3 per cent to a median of 21.3 per cent in the younger group, and from a median of 0 per cent to a median of 33.9 per cent in the older group. It can be seen that even though there is a slightly greater tendency for the younger children to prolong syllables under control, under DAF there is a greater amount of syllable prolongation for the older children ($p < .01$).

While there was a slight tendency for the whole group to decrease the number of intrusions under delay (Tables 2a, 2b), the older children showed a greater decrease in their intrusions than did the younger children (Table 3). This difference is significant at the .01 level.

There seems to be no difference between the two age groups in the number of syllables and words repeated. As indicated above (Table 1), there was an increase in the number of repetitions under DAF, but this effect was equal in magnitude for the younger and for the older children (Table 3).

Correlations were computed between age in months and each of the measures under the DAF condition (Table 4). Partialling techniques were used to hold the control condition scores constant.³ The partial relating word rate

³ The correlations used were Kendall's Tau. Since there are no methods for testing significance of partial Tau's no p values are reported for the partials.

TABLE 3
MEDIAN AND QUARTILE DEVIATIONS ON SPEECH MEASURES FOR YOUNGER AND OLDER GROUP UNDER CONTROL AND DELAYED AUDITORY FEEDBACK

		Control			DAF			DAF-control		
		Mdn.	Quart. dev.	p	Mdn.	Quart. dev.	p	Mdn.	Quart. dev.	p
Word rate	Younger	1.48	.41	<.01	.75	.14	NS	— .50	— .29	<.001
	Older	1.92	.34		.80	.16		— 1.16	— .25	
Percentage of syllables prolonged	Younger	.3	1.0	<.05	21.3	5.4	<.01	21.1	5.9	<.01
	Older	0	.2		33.9	11.3		33.4	11.3	
Percentage of intrusions	Younger	1.4	1.5	NS	1.6	2.3	NS	0	1.2	<.01
	Older	1.5	2.3		0	1.4		— .6	1.5	
Percentage of words repeated	Younger	0	.8	NS	2.5	1.2	NS	1.7	1.3	NS
	Older	.7	.6		1.8	2.1		1.1	1.8	
Percentage of syllables repeated	Younger	0	.5	NS	4.9	1.9	NS	3.8	2.6	NS
	Older	0	.5		4.8	4.2		4.6	5.7	

under delay with age, in months, conforms with the observation made above that while age and word rate under control are related, DAF forces everyone to the same word rate regardless of age. The partialled tau between age and percentage of syllables prolonged was .22, and between age and percentage of intrusions was $-.24$. These findings are consistent with the comparisons between younger and older children given in Table 3. Since the control score is held constant in a partialling technique, these results indicate that the differences between the scores of younger and older children for these measures under DAF were not due to differences in their control levels. The low partials for percentage of syllables repeated and percentage of words repeated confirm the lack of difference between younger and older children on these measures shown in Table 3.

TABLE 4
CORRELATIONS (KENDALL'S TAU) BETWEEN CONTROL AND DAF, AGE AND CONTROL,
AGE AND DAF; AND AGE AND DAF WITH CONTROL PARTIALLED

	Control-delay	Simple-correlations Age-control	Age-delay	Partial Age-delay. control
Word rate	.36**	.26*	.03	$-.07$
Percentage of syllables prolonged	.04	$-.20^*$	.21*	.22
Percentage of intrusions	.39**	.03	$-.21^*$	$-.24$
Percentage of words repeated	.20	$-.08$	$-.08$	$-.06$
Percentage of syllables repeated	$-.11$	$-.01$	$-.08$	.07

* $p < .05$.

** $p < .01$.

Tabulation of the interview responses by age groups revealed significant differences between the responses of the younger children and those of the older children (Tables 5 and 6). The numbers in these tables indicate the percentage of children in each age group giving the responses indicated.

The older children almost invariably identified the voice they heard as their own, under both control and DAF conditions (Table 5). Approximately one half of the younger children gave various other answers to this question for both conditions. The earphones were identified as the immediate source of the sound by a third of the older children for both conditions of the experiment, whereas the younger children most frequently identified the microphone or some other piece of apparatus as the sound source. The older

children often indicated that they did not like the sound of their voice under either experimental condition. The younger children for the most part liked the sound of the voice they heard.

TABLE 5
RESPONSES OF YOUNGER AND OLDER CHILDREN TO INTERVIEW QUESTIONS

	After Control		After DAF	
	1. "Whose voice did you hear?"			
Age	"my own"	other ^a	"my own"	other ^a
4-6	47%	53%	53%	47%
7-9	89%	11%	96%	4%
	2. "Where was it coming from?"			
	"my earphones"	other ^a	"my earphones"	other ^a
4-6	4%	96%	4%	96%
7-9	37%	63%	36%	64%
	3. "Did you like the sound of it?"			
	"yes"	other ^a	"yes"	other ^a
4-6	90%	10%	78%	22%
7-9	63%	37%	52%	48%

^a Under "other" we have not asked for a response.

^a Under "other" we have put the percentage of children giving any response other than the one stated.

Almost all of the children indicated an awareness that the voice they heard while speaking under delayed auditory feedback sounded different from that heard while speaking under synchronous auditory feedback (Table 6). When asked about the nature of this difference, the younger children almost invariably answered that the second voice "was louder"; none of them gave any indication that they appreciated a disturbance in time relationships while speaking under DAF. In sharp contrast, one half of the older children indicated a clear appreciation that there were disturbances in time relationships while speaking under delay. Typical responses in the older group were: "it was longer," and "it kept repeating what I said." These will be found tabulated under the heading "time references" (Table 6).

TABLE 6
RESPONSES OF YOUNGER AND OLDER CHILDREN TO INTERVIEW QUESTIONS ASKED AFTER THE DAF CONDITION

	1. "Did your voice sound different from before?"	
Age	"yes"	"no"
4-6	88%	12%
7-9	100%	0%
	2. "What was different about it?"	
	Time reference	No time reference
4-6	0%	100%
7-9	48%	52%

C. DISCUSSION

The most marked changes in speech under DAF were the decrease in word rate and the increase in the percentage of syllables prolonged (Table 3). Both of these changes were significantly greater for the older children (Table 3). Parallel to these objective changes are the subjective responses, which showed the older children to be far more aware of the alterations in normal speaking conditions.

To make certain that there were no differences in auditory receptor function between the younger and older children, we tested the hearing of all the subjects with routine pure-tone audiometric procedures. Although an ordinary school classroom was used for testing, no subject had greater than a 10db hearing loss (re: threshold of normal hearing) for any of the frequencies 500, 1000, or 2000 cps. There were no differences corresponding to age in the audiometric findings.

Are the motor aspects of speech sufficiently more complex for the older children to make them more vulnerable to a delay in auditory feedback? All the basic sounds of English are represented in the vocabulary of the four year old (approximately 1500 words), and all of the parts of speech are present in his verbal discourse (6). However, vocabulary is constantly increasing over the age range we have studied, as is the grammatical complexity of both written and spoken language (6, 7). Speech certainly becomes a more skilled motor activity as a function of age, and might therefore be considered more vulnerable to a "load," or influence tending to disturb it (1). It seemed possible that the older children might be using longer and, therefore, more difficult words; but analysis of the mean number of syllables per word showed no significant differences between the older and the younger children.

Critical in determining the function of the sensory input within the central nervous system is probably the general mental development of the child.

Piaget has demonstrated (8, 9, 10, 11, 12) that there is a dialectical development of self-image and conceptual systems used to organize and interpret experience. For all of the conceptual systems Piaget has studied (e.g., time, space, number, causality, etc.), the young child is seen to begin by interpreting his experience in predominantly self-referred (egocentric) terms. As the child develops, he learns to conceive of himself as an entity which exists independent of specific experiences, and to conceive of experience as conforming to orderly, logical structures independent of his participation. The major shift from the egocentric conceptual function of the young child to the logical conceptual function and increased self-identity of the older child

occurs over the age range studied in the present experiment. Piaget has shown that the early speech of the child largely reflects egocentric functions, and only at age 7-8 begins to reflect predominantly social, communicative functions (8). Although there has been some disagreement about the extent of egocentricity in the speech content of young children, most of this controversy concerns the definition of egocentricity, and the type of data most valid for exploration of the question (6, 7).

Goldfarb and Braunstein (4) have studied the effects of delayed auditory feedback on the speech of schizophrenic children from 8-10 years of age. The schizophrenic children showed less objective change in their speech under DAF than did control subjects. Several identified the voice heard while speaking under DAF as the voice of another person. The results of their experiment suggest a relationship between the effect of DAF on speech and the child's concept of self-identity.

In the present study, the greatest change in speech under DAF occurred in the older children. They recognized their own voice, and were displeased by modifications in it; they correctly located the source of the sound in space, and half of them recognized that there was a distortion in the normal temporal sequence of events accompanying speech. It would appear, then, that the older children have developed a clearer sense of their own identity as distinct from other things; and while our experiment cannot shed much light on the development of logical conceptions, the older children certainly understood better the spatial and temporal characteristics of the test situation. These findings suggest that the advanced development of self-identity and conceptual function in the older child makes him more dependent on an unaltered auditory feedback for the optimal monitoring of his speech.

The idea that the older child is more dependent on an unaltered sensory feedback could be examined for other sensory modalities and other motor tasks than those considered in this experiment. Such studies might yield a profile of differential dependence on various types of sensory feedback as a function of age. Such data might be of interest in the comparison of different psychiatric and neurological patient populations.

How might differences in conceptual function result in differences in behavioral response to speech under DAF? Perhaps the central neural activities which underlie differences in conceptual function result in different types of "utilization" of the delayed auditory feedback within the central nervous systems of younger and older children.

It is also possible that the observed differences in behavior may be brought about by differences in function at the receptor level. It has been demon-

strated that stimulation of central neural structures can alter afferent neural activity (5). This has been shown for muscle spindle response, touch, vision, olfaction, and hearing. We can conclude, then, that appropriate central neural activity can affect sensory input to the central nervous system; and it is possible that the neural correlates of conceptual function might affect sensory and perceptual processes by modifying patterns of afferent neural activity.

D. SUMMARY

Eight to 10 normal children in each age group from four to nine years spoke under conditions of undelayed and delayed auditory feedback. The children were questioned about their subjective responses to the experimental conditions.

Objective measures of speech revealed that the older children (7-9) showed more change in speech under DAF than did the younger children (4-6). Interview material showed that the older children were more aware that they heard their own voice while speaking, that it was coming from their earphones, and that it sounded unpleasant when delayed. Many of the older children expressed an awareness that DAF represented a temporal distortion of the events which accompany normal speech, whereas none of the younger children expressed such an awareness.

It was suggested that the greater disturbance in the speech of the older children under DAF is related to their more developed conceptual systems of self and time. The possibility that conceptual function affects sensory and perceptual function was discussed.

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PARENTAL ACHIEVEMENT DRIVES FOR PRESCHOOL
CHILDREN, THE VINELAND SOCIAL MATURITY
SCALE, AND THE SOCIAL DEVIATION
QUOTIENT*

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A. PARENTAL ACHIEVEMENT

Every year several hundred children are examined at the Yeshiva University Psychological Center to determine their eligibility, IQ-wise, for admission to schools for intellectually gifted children. In the course of administering the tests to these children and interviewing their parents, our staff have become increasingly aware of manifestations of neurotic behavior in a significantly large number of these children.

Brought to us for psychological evaluation by their parents (generally the mother), these children, whose mean age and mean IQ are respectively 4.69 and 126.63, come from predominantly upper-mobile middle class homes. Their parents either are already professionals or are planning to train for professional careers. A desire to have their children grow up as quickly as possible was expressed by most of these parents who are anxious to return to professional careers or other valued activities interrupted by childbirth and child-rearing. In some cases, these mothers evidenced great impatience to begin training for a new career which they were planning to undertake. In any event, the current stage or period in the child's life is one through which the parents are anxious to hurry, if this were possible, in order to go on to something better both for the child and most likely even for themselves. In many instances, these mothers told the examiners that the reason they had children was either: (1) to get it over with, (2) because it was the thing to do, (3) because it was expected of them, or (4) because they understood that life was not complete without a child.

In the majority of cases, these parents professed love for their children to whom they wished to give every possible advantage, such as early dance and music lessons. Whether or not these ambitions might possibly be based

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upon the frustration of their own mastery motives, or the projection of their own inner drives upon their children, these parents undoubtedly have high achievement aspirations for their children. In the discussions held with these parents regarding the history of the early development of their children, we were generally told that these children showed independence at a very early age—whether in toilet training, eating, or play activities.

We became extremely curious about possible explanations for the neurotic behavior manifestations noted among the children and wondered whether there might be some relationship between this and the intense social ambitions of the parents for these children. We pondered over the possibility that the neurotic symptoms in these children might be produced by their inability to meet the high expectations of the parents. We asked ourselves what effect, if any, the pressures and motivations exerted by the parents might have had upon these children who, like all other children, must meet successfully the social demands made upon them in order to obtain the social approval for which they hunger. Since it is commonplace for the parents to seek greater achievement for boys than girls, we wanted to check the possible effect of this factor on the comparative social maturity of boys and girls.

We set out, therefore, to try to isolate and describe those social activities among the children which were important to their upper-mobile middle-class parents. We thought that, by administering the Vineland Social Maturity Scale (Doll, 1953) to the parents, we might obtain some understanding and measure of the differential pressure for social adjustment or achievement exerted by the parents, and a picture of which skills they considered would be of most credit to their children. From this test we expected to get a clearer estimate of the specific social skills and abilities important to this group of parents—as measured by the Vineland Scale. With this data, with the children's individual test records, and with the observations of the staff members of our clinic, we hoped to be able to find a more accurate measure for the child's performance and achievement in certain areas.

We further felt that a study of the discrepancies between parent expectations for their children, as seen in the Social Age of the Vineland Social Maturity Scale, and the children's achievement, as given by the Binet (Terman & Merrill, 1937) might give us some clues to the pressures consciously or unconsciously exerted upon these children, and a yardstick for *the group* which might be helpful in explaining the manifestations of neurotic behavior previously noted. As a rule of thumb, we decided to accept as normal parental ambitions for the child of above average intelligence, an SA which is above the CA and below or equal to the MA. If the SA is

above the MA it is considered pathognomonic. As an index of pathology, we devised and used the following formula:

$$\text{Social Deviation Quotient (our term)} = \frac{\text{SA} - \text{MA}}{\text{CA}} \times 100.$$

Our expectations were that a group which showed, *on the average* a greater or higher SDQ would also exhibit a higher frequency of neurotic behavior patterns. We further anticipated that the greater this index (SDQ), the more intense would be the anxiety of the child because of his internalized need for social achievement which cannot be realized; thus bringing about feelings of inadequacy which could express themselves also in other areas.

B. PROBLEM

It is important to make clear, however, that we are not offering the SDQ as a tool in individual diagnosis but merely as an indicator or possible gauge of the mental hygiene implications involved in conflicts which arise in the child who is unable to satisfy the aspirations of his parents. Some of the problems involved in this study are listed below:

1. What areas of social development in children are considered important by upper-mobile middle-class parents, and at what ages?
2. Do the parents have greater aspirations for boys than for girls, and, if so, at what level and with what effects?
3. What is the differential as expressed in the Social Deviation Quotient (SDQ) between the parental estimate of the child's social maturity and the child's mental age?
4. What relationship, if any, exists between the examiner's observation of the child's behavior and the child's SDQ?

C. PREVIOUS RESEARCH

Merrill (1946) has shown that parental achievement needs will bring about pressure on their children to achieve. McClelland et al. (1955), showed that children in homes where early independence training was favored had greater motivation to achieve independence than those coming from homes where such training was not favored. Furthermore, Rosen (1956) found that children from the upper social strata have a need for higher achievement scores; a need which we feel probably stems from parental pressures and examples. In confirmation of this point, it seems to us, is the research finding which indicates that boys have higher achievement drives (levels of aspiration) than girls (Walter & Marzolf, 1951).

At first glance, there may seem to be a contradiction between the findings of McClelland, Merrill, and Rosen and the thesis of this paper. Upon further analysis, however, it becomes apparent that we are in complete accord with the aforementioned research. There is little doubt that the social aspirations and expectations of parents for their children serve to motivate those children to greater effort. In fact, since previous research has proven this factor to be important in social achievement, we have *ipso facto* assumed that it played an important role in our examinations. Our greater concern in this investigation was with those aspects of parental motivation of children to social achievements which have not been covered in previous data. We focused on the possible peripheral or side effects of such motivation by ambitious parents. We considered the possibility that the neurotic behavior manifestations observed in our young subjects might be such a side effect produced by parental drives.

One must be on guard here to differentiate and discriminate between parental motivation of children to social achievements that are beneficial and satisfying as against those which may be frustrating and harmful. One of the determining factors, in our opinion, is the "realism" of the parent in appraising the capacity of the child for social achievement so that expectations will be maintained at a realistic and healthful level. Children will exert tremendous effort, usually, to meet the expectations of parents and thus, incidentally, gain approval. But there is the possibility that when children exhibit social skills and achievements which are not only beyond their chronological age level (which would be reasonable to expect from superior children) but even much beyond their mental age level, then these achievements (to use the vernacular) are "being bought at too high a price." The cost, in terms of nervous strain and tension, to the child who strives for such high social competence is much too high. Operating under constant stress, the child, even if successful, could very well develop neurotic manifestations such as those observed among the subjects we examined.

D. VINELAND SOCIAL MATURITY SCALE

The Vineland Social Maturity Scale is a standardized developmental schedule, measuring social competence and personal social maturation, in which eight arbitrarily defined categories of social development are evaluated. These categories are: Self-help general (SHG); Self-help eating (SHE); Self-help dressing (SHD); Locomotion (L); Occupation (O); Communication (C); Self-direction (SD); and Socialization (S). There is an unequal distribution of these items at the various age levels the reason for which

(Doll, 1953, p. 54) is that . . . "the item categories are not co-extensive or evenly spread for all life-age ranges. This is most obviously due to changes in the direction of social competence as maturation proceeds, so that some categories 'peter out' as others emerge." Nevertheless, because of the organization of the scale, one is unable to derive meaningful patterns of social development in a specific category—per se.

There are 117 items in the Scale which may be administered either as a point scale or an age scale. The items are arranged in accordance with the increase in average MA needed to pass each item. In either case a social age or social quotient may be obtained. Unlike a test of ability, this scale is usually administered to an informant, in most cases the parent, who knows very well the subject under study. The test, which "postulates at all points a relation between constitutional aptitude and environmental activity" (Doll, 1953, p. 2) is, according to Doll, significantly reliable. He produces evidence to substantiate its validity and reports a correlation of .92 between the first and second examination of a group of feeble-minded subjects.

Although Doll reports a low positive correlation between parental occupations and Social Quotients for children from birth to 10 years of age, he nevertheless cautions against coming to any definite conclusions regarding this relationship because of the small number of cases examined and an unreliability in estimating occupational class (Doll, 1953, p. 388). He also reports that the influence of sex differences on total scores is negligible (Doll, 1953, p. 372).

Patterson (1943) administered the 1916 Binet to 91 children whose mean CA was six years. He found that their mean MA was 7.1 and the mean SA was 6.8. Wile and Davis (1939) made a comparative study of two problem groups, one of superior and the other of inferior intelligence. In the superior group there was infantilism, regressive emotional behavior and hypochondriacal tendencies. The superior group had a CA ranging from 2.8 to 13.6 with a median of 8.7. The MA ranged from 3.3 to 18.0 with a median MA of 10.8. The range in SA was from 3.0 to 17.0 with a median of 9.0. It would appear from this that, with superior children, the SA is above the CA but below the MA.

Our method of administering the Vineland Social Maturity Scale was experimental and quite different from the orthodox procedure recommended in the Manual of Instructions. Whereas the test is usually given orally by a trained clinician who records the informants' replies, and, if necessary asks questions, we presented the parent with the written test (our format) and asked the parent to check the answers on the test sheet. The previous

findings of Doll regarding the reliability and validity of the test obviously no longer apply in our case because of the changes we made. In fact, we do not know whether or not the test as we gave it is either reliable or valid. Nevertheless, for the purposes of this investigation, this becomes merely a moot question since we are not interested in the actual social maturity of the child. Rather, our attention was focused especially on what the parents thought or hoped these children were.

Fully cognizant of the manifold possibilities of error, as Doll also has pointed out, we must bear in mind that possibly some of the items have a different order of difficulty today or are not applicable due to the changes in American life since the test was standardized. In addition, parents have varied experiential backgrounds and history and the meanings of the descriptions of behavior may be different to some than to others. Doll also mentions the semantic problems implicit in this test. To "play cooperatively at kindergarten level," or "goes about neighborhood unattended" could be interpreted quite differently by different people, depending upon what "cooperatively," "kindergarten" and "neighborhood" mean to them. There is also the possibility that parents will check an item that they did not observe either because they "believe" they did or because the description is vague.

We made no changes in the test itself other than to omit the sections for ages 0 to 3 and 18 to 25. Keeping the same sequence, we merely changed item No. 45 (walks downstairs one step per tread) to our No. 1 and continued to Doll's item No. 95 (buys all own clothing) which became our last item No. 51. We then had a Social Age range of from 3 to 18 years.

E. PROCEDURE

Our procedure was to secure, prior to the child's testing, a brief outline of the child's early developmental history. We discussed the parent's attitude toward the child as well as the child's attitude toward the parents and peers, play activities, hobbies, etc. At the end of the interview the examiner would present the check list to the parent with instructions to check only those items which the child performed *habitually*. It was very clearly and forcefully explained to the parent that, although this scale would help us to evaluate the general development of the child, the data secured thus would not figure in any way or influence our judgment about the child's performance on the Revised Stanford Binet. Thus, the completion of the blank was a natural outgrowth of the interview situation.

We decided to let the parents fill in the check list themselves, rather than to use the recommended interview technique, because we wanted the parent

to define the items in her own terms, which the mother would be forced to do if left alone with the check list. There are, of course, many possible criticisms of this method of which we are aware. In each case, however, we concluded after some thought and discussion that our procedure was the lesser of the many evils and might give us more honest results.

The major criticism of our method is the possibility of the parent misunderstanding the items on the Check List without the safeguard of interpretation and explanation by the examiner. We decided, however, that it would be more significant and meaningful to obtain the interpretation of the parents, even if they did not understand the item as the originator of the test intended. Another criticism, obviously, is that, despite our explanation of the use of this scale, the parent might so to speak, "stuff the ballot," and credit the offspring with an abundance of undeserved checks—handed out in a desire to guarantee the child's admission to the highly selective school. In our opinion, this eventuality could only serve to supply us with additional valuable information about these parents. Certainly parents who performed in this way would demonstrate intense social achievement ambitions for their children. In fact, it has occurred to us that perhaps, in an upper-mobile middle-class group, social achievement may be equally as important and even equated with mental abilities.

While the parents completed the Check List, the children were given the Stanford-Binet (Terman & Merrill, 1937), and their adjustment was briefly evaluated by the examiner. At the end of the respective examinations, the writer would discuss the results of the intelligence evaluations, as well as some of the items on the Check List and their meanings, with the parents.

Evaluation of the child's adjustment was based upon the observations of the examiners, developmental history, and parental discussion of their child's behavior. At first we asked four psychologists, to whom an abbreviated synopsis of each child was given, to rate each child's behavior on a three point scale. The correlation between these ratings, however, was very low and useless for our study. We then hit upon another expedient. We asked three other clinical psychologists to arrive at a pooled judgment as to whether the child was adjusted or not. The behavior was to be dichotomized by them into two categories, adjusted or maladjusted. We realize this was essentially a "forced choice" technique and that we, in our instructions, forced the clinicians to the wall. We agreed with them that, in many instances, it is impossible to make a valid judgment and that, in many others, there is room for a legitimate difference in opinion. In view of the fact that this is a preliminary study, and that we could see no other way out of our dilemma, we decided to adopt this expedient.

F. RESULTS

We selected the scores of a total of 165 children, whose age ranged from three years to five years, 11 months.

Table 1 shows the mean CA, MA, SA, IQ, SQ, and SDQ and the corresponding SDs for the entire group, broken up into half-yearly intervals. An examination of Table 1 indicates that, at every age, the mean SA and the mean SQ are higher than the mean MA and IQ.

We then tabulated the results for the boys and girls separately and found that, among the boys ($N = 74$) the SA was lower than the MA in five cases (6.75 per cent) and equal to the MA in one case (1.35 per cent). Among the girls ($N = 91$) the SA was lower than the MA in two cases (2.20 per cent) and in three cases (3.29 per cent) the SA was equal to the MA. In every case, both for the boys and girls, the SA was higher than the CA.

Table 2 presents the means and SDs of the CAs, MAs, SAs, IQs, SQs, and SDQs of the boys and girls. We may note that the differences between the means are statistically insignificant.

Table 3 shows the percentage of children checked by parents as usually performing the activities indicated by the items on the Vineland Social Maturity Scale, arranged as an age scale. Some of the items such as "Engages in adolescent group activities," or "Performs responsible routine chores" which were checked by the parents appear preposterous on the face of it. Yet, when the parents were nondirectively queried about these items, they said that their children did just that!

We may note that there is a general increase in the percentage of children performing certain activities as they get older. We may further note, however, that within each age grouping the percentage passing or failing an item does not depend upon the difficulty of the item, but to some extent on the social maturity category to which each item belongs.

In order to verify the above supposition, Table 4, indicating the rank order of importance of the various categories of the Vineland Social Maturity Scale was prepared. The rank order of importance of the various social areas to the parents was determined as follows: Each item MA (Doll, 1953, p. 366) was multiplied by the average percentage checked by parents for that item (see Table 3). Then the average for the sum of these products for a category was obtained.

Table 4 presents the Social Maturity categories arranged in rank order. We recognized that Table 4 is an approximation and gives a rough idea of

the importance of these areas to parents. We may note that Self Help ranks first, and that Locomotion ranks last.

The biserial correlation between SDQ and the level of adjustment as rated by the clinicians was $-.034$. This is statistically not significant.

TABLE 4
RANK ORDER OF THE SOCIAL DEVELOPMENT CATEGORIES OF THE VINELAND
SOCIAL MATURITY SCALE

Rank	Category
1	Self-Help Eating
2	Occupation
3	Self-Help Dressing
4	Communication
5	Socialization
6	Self-Help General
7	Self-Direction
8	Locomotion

G. DISCUSSION

Although we feel that the weight of data militates against it, it must be indicated that another hypothesis than the one we preferred to use to interpret our findings might be entertained. It might be claimed that the unusually high social achievement ratings given to the children by their parents might not be an aspect of achievement motivation in operation but rather of the parent's desire to secure admission for his child in a school or class for intellectually gifted children. If this hypothesis were accepted, it would place a completely different hue and dimension upon this study, indicating that what the parents thought their children should have achieved biased the data and thus affected the results. At any rate, we are submitting our results for whatever they may be worth.

Our hypothesis that there would be statistically significant differences between the SAs, SQs, and SDQs of the boys and girls was not borne out by the data. Our findings may be due to the fact that while it is true that in our civilization, boys and girls have different goals, at different ages, which may also determine the achievement orientation. Boys are generally more anxious to achieve in intellectual areas and girls in social areas. However, we may presume that the achievement goals set by parents for boys and girls of the age group we have examined are nearly the same and a Check List measuring parental expectations of social maturity areas will naturally show no difference in favor of either sex. Another possible explanation is that, since the vast majority of our informants were women, they uncon-

sciously expressed both for their boys and girls what they considered the ideal social maturity at their children's age should be.

Contrary to the data produced in other studies, it should be noted that our statistics show a mean SA which is higher than the mean MA at every age level under consideration. They may be due to a change in the difficulty of the items, to a variance in the socio-economic composition of our group as compared with the group upon which the Vineland Social Maturity Scale was originally standardized, or to the difference in methods of administration.

The fact that no relationship was found between SDQ and the examiner's observations of behavior does not in our opinion negate the value of SDQ. We must consider the fact that our choice of criteria of adjustment, as well as the "forced choice" technique of the judgment of adjustment which we forced our raters to adopt, could at best bring about only equivocal results. We feel that a restudy of this problem, using much finer behavioral material on a child (observations over a prolonged period of time of a child's behavior in a nursery school and at home) coupled with a sampling of parents coming from a variety of socio-economic backgrounds would most likely be productive of a fairly substantial positive correlation between SDQ and emotional adjustment. It is after all a truism, that some internal strain may not become obvious upon a hurried examination and that a restriction in the sampling to only one socio-economic group may only serve to reduce any existing relationship to a vanishing point.

At any rate, an analysis of the SDQ for our group, brings very forcibly to mind the fact that children from upper-mobile middle class homes work under tremendous pressure imposed upon them either consciously or unconsciously by their parents. Some of these children acquit themselves very well and grow up to be normal, successful adults. Others also achieve, but retain an unconscious feeling of neurotic strain for the rest of their lives. Still others break down either into downright psychosis or severe neurosis.

We propose, in conclusion, that even though our results may only be valid for a part of our population, the mental hygiene implications of this study are sufficiently vital and challenging to merit further consideration and exploration.

H. SUMMARY

A study of the parental checks on a modified Vineland Social Maturity Check List indicated that upper-mobile, middle-class parents give their pre-school children very high social maturity ratings. A Social Deviation

Quotient was devised which was as follows: $\frac{SA-MA \times 100}{CA}$. It was hy-

pothesized that the child's adjustment as observed in the clinic setting would correlate with SDQ. It was further hypothesized that boys would have higher SAs than girls.

The Vineland Social Maturity Check Lists of parents of 74 boys and 91 girls, ranging in age from three years to five years, 11 months, were analyzed. The boys had a CA, MA, SA, IQ, SQ, and SDQ of 4.65, 5.89, 7.89, 126.89, 170.17, 43.67 and the girls had a CA, MA, SA, IQ, SQ, and SDQ of 4.77, 5.99, 8.10, 126.20, 170.18, 44.59 respectively. There were no statistically significant differences in any of these scores between boys and girls. The SA was higher than the CA in every case. In 93 per cent of the cases, the SA was higher than the MA. There was no relationship found between SDQ and child adjustment as rated by three clinicians. The achievement of Self-Help in eating was ranked first by the parents.

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PROGRESS IN THE USE OF ENGLISH AFTER TWENTY YEARS
BY CHILDREN OF FILIPINO AND JAPANESE
ANCESTRY IN HAWAII*

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In 1938 we completed a study of the use of English of preschool children of bilingual background in Hawaii (5). In 1957 we reported a repetition of a section of the study dealing with the children of Chinese ancestry (4), whose records had been gathered first in the previous study.

In this article we report the follow-up study of the children from the three major groups that showed the greatest retardation in the use of English in the 1938 study. These three groups are Japanese, Filipinos residing in Honolulu (hereafter referred to as urban Filipinos), and Filipinos residing in rural areas in Hawaii (hereafter referred to as rural Filipinos). In the present study, we compare only 4- and 5-year-olds instead of 2- to 6-year-olds as before. The rural Filipino sample was selected from children living in rural sections of the islands of Oahu and Hawaii.

As in the previous study, a record of 50 sentences was made for each child while he was at play with other children at his home or its vicinity. As in the earlier study, the samples were selected so that the percentage distribution of the fathers' occupations corresponded with that of men of the same ancestry according to the latest U.S. census data (1950). The interviewers were of the same ancestry as the subjects.

The Barr rating of the fathers' occupations of the 1958 sample indicates an average increase for these three groups from .66 to 1.50 points on the scale (see Table 1). The rise in the average Barr ratings of fathers' occupations reflects the upward socio-economic movement of the Japanese and Filipinos in Hawaii in the last two decades. The higher Barr rating for the Japanese, 9.28, as contrasted with the urban and rural Filipino groups, 7.00 and 7.26 respectively, reflects the fact that, by and large, the Filipinos, as more recent arrivals in Hawaii have had less time to ascend the economic

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ladder (1). This fact is further corroborated by the higher percentage of parents, 95 per cent, of Japanese children, who were born in the United States as compared with the two Filipino groups—urban, 50 per cent and rural, 83 per cent. In the urban group, 70 per cent of the fathers and 30 per cent of the mothers were born in the Philippines. In contrast, the 1938 figures for these three groups were 41 per cent, 18 per cent, and 2 per cent respectively. Except for the urban Filipino group, the overwhelming majority of the parents of the 1958 sample were born in the United States.

The parents of the children in the present study are better educated than those of 20 years ago. Only education received in the United States was considered. The average amount of education is 11.5 years for the parents of the Japanese group as contrasted to 2.7 years 20 years ago. For the urban Filipino group, the average is 8.8 years of schooling as against 4.1 years; and for the rural Filipino group, it is now 9.6 years compared with 3.2 years in 1938.

Practically no other language besides English is now spoken in the children's homes. However, in 1938, on the average, some foreign language was spoken by all three groups, and by the Japanese at least as often as English. The language ratings of homes (see Table 1) reflect the Anglicizing of speech in Hawaii among these two racial groups. The language rating, ranging from 3.3 to 3.9 on a five-point scale, primarily reflects the amount of pidgin English now spoken rather than an ancestral language.

In 36 of the 50 Japanese homes, no one prefers to use Japanese although all of the parents had been educated in Japanese language schools and a few had received all or part of their education in Japan. In 11 homes, a grandparent who prefers to speak Japanese resides and in only 3 homes does one parent prefer that language. Even the children's names reflect the tendency toward Anglicization. In the earlier study, almost all of the children's given names were Japanese; now none are, and in only one case did a child call a playmate by a Japanese name. This use of Anglo-Saxon given names was influenced by conditions during World War II when many adults of Japanese ancestry changed their first names or added an Anglo-Saxon name. Since then children are usually given names in both languages.

In 45 of the 50 urban Filipino homes, neither parent prefers to speak a Filipino dialect, even though 50 per cent were born in the Philippines. There are 11 homes in which a grandparent resides who prefers to speak a Filipino dialect and in six other homes there are other adults living who prefer to speak a Filipino dialect.

In the case of the rural Filipinos, only one parent speaks a Filipino dialect

as the preferred language. In these homes there are 20 grandparents who prefer to speak a Filipino dialect and 16 others who speak pidgin. There are also three other adults living in the various children's homes who prefer to speak a Filipino dialect, nine who speak pidgin, and three who speak standard English. Among both Filipino groups, pidgin English is the preferred language.

As was found in the children of Chinese ancestry (4) those of Japanese and Filipino ancestry do not speak the language of their ancestors. Many children used no language other than a form of English, although a few included one or two commonly used Hawaiian words. A majority of the children might be considered bilingual only if pidgin English is considered a language rather than a dialect. Only three Japanese children used more than five Japanese words; and no Filipino, urban or rural, used as many as five words of any Filipino dialect. As shown in Table 2, the percentage of English words spoken by the Japanese children is 99.0 per cent compared to 49 per cent in 1938; by the urban Filipino children, 99.4 per cent versus 94 per cent in 1938; and by the rural Filipino children, 99.4 per cent as against 75.5 per cent.

Consequently, the classification of mixed sentences are very few, being 1.0 per cent for the urban Filipinos, 1.1 per cent for the Japanese, and 1.8 per cent for the rural Filipinos. Some of the sentences were mixed by the inclusion of Hawaiian words rather than those of the ancestral language; nevertheless, Table 2 shows that the children incorporate a negligible amount of foreign words in their speech. The non-English words used include several proper names, which are not considered in the classification of mixed sentences.

Except for the urban Filipinos, at each age the children used longer sentences than those in the 1938 samples. The average sentence length for the four-year-old Japanese children in this study is 4.1 words and for the five-year-olds, 4.2 words. The Japanese children of four years used sentences averaging 1.2 and at five years, 0.9 of a word longer than the 1938 sample. These differences are statistically significant at more than the .01 level of confidence. The two Filipino samples used sentences averaging less than four words in length. Only in the case of the four-year-olds among the rural Filipino children is the difference in sentence length statistically significant when compared with the 1938 sample.

The 1958 Japanese and rural Filipino groups use a greater percentage of compound-complex sentences than did their counterparts 20 years ago. For the Japanese, this percentage has increased from 5.1 to 9.1, and from 5.2 to

5.8 for the rural Filipinos. The urban Filipinos showed a .9 per cent decrease (6).

The children in the 1958 samples conjugated a greater percentage of verbs than those in the previous study. The Japanese conjugated approximately one-fourth of the verbs used, reflecting about an 8 per cent gain. The urban Filipinos conjugated 19 per cent of the verbs. The gain during the twenty year period is 6 per cent. The rural Filipinos conjugated 21 per cent of the verbs used, reflecting a gain of 10 per cent.

The error indices (number of errors per 1,000 words) for the three groups reflect an approximate 50 per cent reduction in the number of errors. The 1958 Japanese children made the fewest number of errors, followed by the urban Filipinos and rural Filipinos. All differences in the error indices of the 1938 and 1958 samples are significant at less than the .01 level. Most of the errors made by the children can be attributed to their use of pidgin English. The speech of the children in the 1958 samples reflects the influence of pidgin English, which is spoken by most of their parents and playmates. It is interesting to note that in a few cases where the parents did not speak pidgin English, the children did make some pidgin English errors.

SUMMARY AND CONCLUSIONS

1. Fifty children of Japanese ancestry, 50 Honolulu children of Filipino ancestry, and 51 rural children of Filipino ancestry who were from 42 to 66 months in age are compared as to their use of the English language with the same number of children of similar age and ancestry who had been studied in 1938. The children in all six samples were selected so that the distribution of their fathers' occupations was similar to that given in the latest federal census.

2. In the 1938 study, the Japanese children used English words 49 per cent of the time. In the present study, few of the children used any Japanese words at all—less than 1 per cent of the total words spoken. In 1938 urban Filipinos used 94 per cent English words when speaking and the rural Filipinos, 75 per cent. Now more than 99 per cent of the speech of both these groups is in English. None of the children were classified as bilingual.

3. In 1958 the Barr ratings for fathers' occupation show that the Japanese fathers average 9.28 on the scale, an improvement of .66 over 1938; the urban Filipino fathers 7.00, an improvement of .77; and the rural Filipino fathers 7.26, an improvement of 1.76.

The per cent of parents born in the United States for the 1958 samples is as follows: Japanese, 95 per cent; urban Filipino, 50 per cent; and rural

Filipino, 83 per cent. In 1938 these data were 41 per cent, 18 per cent, and 2 per cent, respectively.

The average education of both parents is 11.5 years for the Japanese, 8.8 years for the urban Filipinos, and 9.6 years for the rural Filipinos. In 1938 the amount of education for the respective groups was 2.7, 4.1, and 3.2 years. These figures reflect a substantial improvement in the educational level of the parents over the past 20 years.

The language rating of the homes in 1958 is 3.9 for the Japanese, 3.8 for the urban Filipinos, and 3.3 for the rural Filipinos, as contrasted with the 1938 ratings of 2.0, 2.2, and 1.9, respectively. The reason for the average remaining below 5.0 is that pidgin English is still spoken in many of the homes by one or both parents. Twenty years ago either the ancestral language and/or pidgin English was spoken exclusively.

In the thirties, the urban Filipinos were more proficient in English than the rural. Now the reverse is the case. The probable reasons for the change may be suggested: After World War II, many Filipinos who came to Hawaii sought work in the city rather than on the plantations where the number of jobs was declining; also the segregation of races in plantation villages has been abandoned so that there are few Filipinos who do not have near neighbors of other races; then, too, increasing mechanization of the plantations has given opportunity for skilled labor, as indicated in the higher Barr rating.

4. In 1958 the children in these three samples incorporate a negligible number of foreign words in their speech. This is in contrast to the 1938 samples, when the Japanese children's speech included only 49 per cent English words, the urban Filipinos 94 per cent and the rural Filipinos 75.5 per cent English words.

5. The use of mixed sentences has fallen from 29 to 1.1 per cent for the Japanese; from 13 to 1 per cent for the Honolulu Filipinos; and from 23.5 to 2.2 per cent for the rural Filipinos. Many of the sentences were classified as mixed because of the inclusion of commonly used Hawaiian words, rather than the ancestral language.

6. The sentence length of the three groups studied here reflect that they had not attained the norms for their ages when compared with a monoglot population (4). The Japanese 4-year-olds attained the 3½-year-old level and the 5-year-olds almost attained the 4-year-old level. The urban Filipino 4-year-olds attained the 3-year-old level in sentence length and the 5-year-olds almost achieved the 4-year-old level. The rural Filipino 4- and 5-year-olds almost attained the 4-year-old level.

In the case of the Japanese children of the 1958 sample, the gain in sentence

length is statistically significant for both age groups. For the two Filipino groups, only the gain of the rural 4-year-olds is statistically significant.

7. The Japanese children showed the greatest gain in the use of compound-complex sentences, with an over-all average of 9.1 per cent of their sentences falling into this category. In 1958 they attained the level of 3-year-old monoglots in the use of complex-compound sentences. The urban Filipinos showed a decline of .9 per cent in the use of compound-complex sentences, with an average 6.6 per cent. The rural Filipino children's average is .5 per cent higher than the 1938 sample in the use of compound-complex sentences, but only 5.7 per cent of their sentences fall into this category. The children's speech in these two Filipino groups is 2.4 per cent below the level of 3-year-old monoglots but well above the 2-year-old level.

8. The per cent of verbs conjugated was higher for the 1958 samples than the 1938 samples. This percentage and the error index were the only language measures used that reflect a substantial improvement on the part of the members of the three samples included in the present study.

9. There was a significant reduction in the number of errors per 1,000 words on the part of members of all three groups of the 1958 sample. The errors are accounted for, in general, by the use of pidgin English. When comparing the members of the samples in this study with monoglots, their performance is below the three-year-old level.

10. It is interesting to note that when comparing the four ethnic groups (+) on which a follow-up study has been done, the children's background factors for per cent of parents born in the United States, average education, Barr rating of fathers' occupations, results in a rank order of Chinese first, Japanese second, rural Filipinos third, and urban Filipinos fourth. Only on language rating of the home do rural and urban Filipinos exchange third and fourth place.

However, this general rank order of Chinese, Japanese, urban Filipinos, and rural Filipinos, when used for the children's language behavior, obtained only for the per cent of verbs conjugated and sentence length. The use of compound-complex sentences and the error index result in the rural and urban Filipinos exchanging third and fourth place.

For per cent of mixed sentences used, the general order was inverse with the Chinese having the highest number of mixed sentences, 2.4 per cent; however, the differences are so small that they may be attributed to sampling error. It is beyond the scope of this paper to determine which background factors might be causal; nevertheless, the similarities in rank order are suggestive.

11. In conclusion, the preschool children of Japanese and Filipino ancestry in Hawaii are now, with few exceptions, no longer bilingual; however, they may still hear the ancestral tongue spoken by their grandparents or other adults in the home. For the three groups under discussion, one might conclude that by and large these children come to school speaking pidgin English. Although there has been a gain in children's command of English since 1938, the task of teaching standard English is still a major one for the kindergarten teachers inasmuch as the children in the two racial groups studied are retarded slightly more than a year in their use of oral English in terms of the measures used in this study.

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THE EFFECT OF DEPRIVATION AND SATIATION ON
SECONDARY REINFORCEMENT DEVELOPED
BY TWO METHODS*

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A. INTRODUCTION

There is at present little information available on how changes in drive affect performance based on secondary reinforcement. According to some formulations one would expect changes to have a large effect on response output when reinforcement is secondary. Thus, if a neutral stimulus is repeatedly associated with food, and an animal then learns to make a response which produces the stimulus alone, it might be supposed that hunger is an essential accompaniment of the process—i.e., that satiation for food would markedly disrupt the performance.

The present experiment uses a method previously reported (4) for establishing secondary reinforcement by causing entry into a straight-alley runway to follow bar-pressing in the starting box. This method results in a stable performance which can be used to gauge the effect of changes in drive. Dependence of secondary reinforcement upon drive state during training and during the test was examined in the following way. One group of animals learned to run the runway while thirsty, with water reinforcement in the goal box. Another group was trained satiated for water, using as reinforcement the ingestion of saccharine, a sweet-tasting substance with no known metabolic action (1, 3). Both groups then learned to press the bar on an intermittent schedule without further "primary" reinforcement in the goal box, the only reinforcement for bar-pressing being entry into the runway. Finally, drive shifts were made. On alternate days the animals of both groups pressed the bar while they were, respectively, thirsty and not-thirsty.

B. METHOD

1. *Subjects and Apparatus*

The Ss were 12 male albino rats, approximately 110 days old at the beginning of the experiment.

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¹ The research here reported was done while the author was a Public Health Service Postdoctoral Research Fellow of the National Institute of Mental Health (MF-9348) at the University of Washington.

The apparatus has been described in detail elsewhere (4). It consisted of a 9-inch $\times$ 9-inch $\times$ 9-inch starting box with a removable bar, a 40-inch long alley, and a 4-inch $\times$ 12-inch goal box, the three segments being separated by guillotine-type doors. A photoelectric cell beam crossed the runway 4 inches from the starting box door. During the secondary reinforcement test period responses to the bar in the starting box were recorded on a cumulative recorder, and a fixed-ratio schedule was programmed automatically. A tone always sounded immediately after the response at the end of the fixed-ratio series, just before the starting box door was opened, so that the feedback from bar-pressing would be immediate, no matter what the position of the animal when the door opened.

2. Procedure

a. Pretraining. The animals were divided into two groups and given preliminary habituation to the apparatus and to the incentive to be used on reinforced trials during training. One group was allowed to drink from a drinking tube in the goal box while thirsty; the other group, satiated for water, was given access to a .13 per cent sodium saccharine solution contained in a drinking tube of the same type. Thirty pre-trials were given in order to obtain the appropriate behavior to the incentive substance.

A 23-hour water deprivation schedule was in effect throughout the experiment for all animals. When an animal was to be run not-thirsty, it was run immediately after the 1-hour daily drinking period. Otherwise, the experimental session came before the drinking period. Dry food was available in the home cages at all times. Since animals do not consume normal amounts of dry food while thirsty, it is likely that the animals of both groups were somewhat hungry at the time of the experimental session.

b. Training. The training procedure was similar to that described previously (4). Both water-reinforced and saccharine-reinforced animals had the same training schedule.

Intermittent reinforcement of runs to the goal box of the runway was given, with a randomly decreasing frequency of reinforcement. At the conclusion of training the average ratio had become one reinforced trial to five non-reinforced trials. On reinforced trials a door at the far end of the alley opened and the animal was given 15-seconds access to the incentive substance; on non-reinforced trials it remained in the goal box for 15-seconds with the door to the reinforcement compartment closed. Between trials the animal was placed in a waiting cage. Altogether, 100 training trials were given, 62 of which were reinforced. The reinforcements were grouped near

the beginning of the series and came more rarely toward the end of the series.

c. Secondary reinforcement test. The bar was then inserted into the starting box, and the door to the runway was opened only as a consequence of bar-pressing. No further primary reinforcement was given. During the first three daily sessions the number of responses required to open the door was gradually increased to 15, and the 1:15 fixed-ratio was then continued throughout the experiment.

Each animal's daily test session lasted about 45 minutes. Out of this period 35 minutes were spent in the starting box, and the remainder of the time was spent in the runway and in the waiting cage.

d. Drive shifts. During the first five days of the secondary reinforcement test, all animals were thirsty. At the end of this period, the performance had become well stabilized on the 1:15 fixed-ratio schedule. On alternate days, then, the animals were tested thirsty and not-thirsty for 10 additional days. All animals, thus, had 15 daily test sessions and five drive shifts.

The only difference between the experimental procedures for the two groups was the incentive substance used during training and the drive state during training. For the test the sequence of drive shifts was the same for the water-trained group and the saccharine-trained group.

e. Selection of animals. Runway training was given to two groups of six animals each. The two most erratic animals in each group were discarded at the end of training, leaving two groups of four animals each for the bar-pressing test.

C. RESULTS

After 100 runway trials the mean starting time was 0.5 seconds for the water-trained animals and 4.8 seconds for the saccharine-trained animals. All animals in both groups showed consistent running performance.

Bar-pressing was developed on the first five test days. At the end of the fifth test day the performance was stable on a 1:15 fixed-ratio schedule for eight experimental animals in the two groups.

Figure 1 shows the results of the drive shifts. The figure plots the number of responses made by each group for the period from test day 6 through test day 15. The total response output for all animals combined over this period was 3698 responses on thirst days and 2719 responses on non-thirst days. Satiation thus depressed the over-all performance about 25 per cent. The effect on the saccharine group is the same as the effect on the water group. A *t*-test shows that the difference in response scores on thirst days and non-thirst days is significant at the .05 level.

Since cumulative records were taken of the responding of all animals, it was possible to examine in greater detail the manner in which the changes in drive affected behavior. The rate of responding, while responding was in progress, was not altered appreciably by satiation. Rather, on non-thirst days, there was a lengthening of the "pauses" which occurred when the

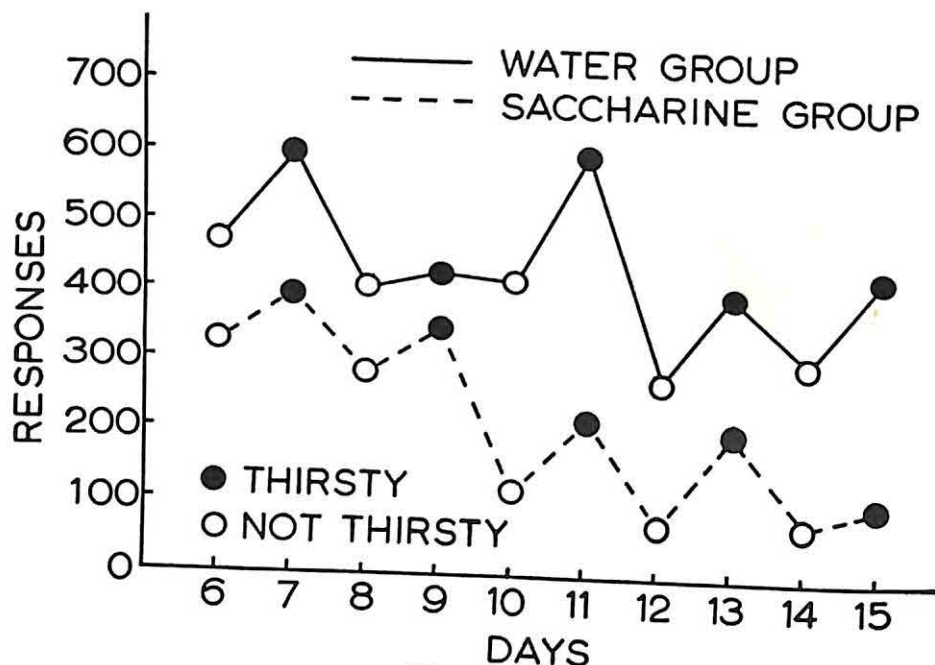


FIGURE 1
EFFECT OF DRIVE SHIFTS ON BAR-PRESSING BASED ON SECONDARY REINFORCEMENT

animal was first placed in the starting box. The first bar-press to occur usually led to a rapid run of responses, on both thirsty days and non-thirsty days. This result is the same as that found by Sidman and Stebbins (2) for the effect of food deprivation on fixed-ratio schedules of primary reinforcement.

D. DISCUSSION

These results indicate that the action of a secondary reinforcer is not dependent upon the presence of *relevant* primary drives. For one group of animals a relevant drive, thirst, showed some relationship to performance under secondary reinforcement, in that satiation for water depressed responding about 25 per cent and that subsequent deprivation increased responding once again. However, saccharine-trained animals, for which the

thirst drive was irrelevant, showed the same decrement in responding when satiated and the same increment when deprived.

This effect is most easily explained by supposing that the changes in drive affected the general activity of the animal. Even in this respect, however, the effect was not large, satiated animals making about 75 per cent as many responses as deprived animals.

Presumably, the use of some incentive (reinforcer) is necessary in order to establish secondary reinforcement; but once established, the performance does not appear to be dependent upon the specific drive state present during training.

E. SUMMARY AND CONCLUSIONS

A previously described experimental situation, in which entry into a straight-alley runway follows a series of bar-pressing responses in the starting box, was used to study the effect of drive shifts on secondary reinforcement developed in two ways. One group of animals was given runway training while thirsty, using water as a reinforcer. Another group was trained not-thirsty, using saccharine as a reinforcer. Both groups then learned to press the bar on an intermittent schedule to open the starting box door, with no further primary reinforcement. On alternate days during bar-pressing the animals were, respectively, thirsty and not-thirsty.

The experiment led to these conclusions:

1. In the runway situation described it is possible to establish strong secondary reinforcement using saccharine as the primary reinforcer.
2. Satiation results in about a 25 per cent decrement in the performance of the response reinforced secondarily.
3. The effect of deprivation and satiation is independent of the method used to develop the secondary reinforcer. Water deprivation during the secondary reinforcement test affects saccharine-trained animals in the same way that it affects water-trained animals.
4. Deprivation and satiation affect only the initial periods of no-responding which occur when the animal is first placed in the starting box. Responses to the bar, once begun, occur at a constant high rate which is not changed by deprivation and satiation.

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DOMINANCE BEHAVIOR OF THE ADULT RAT
AS A FUNCTION OF EARLY
SOCIAL EXPERIENCE*

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A. PROBLEM

In recent years there have been an increasing number of investigations concerned with the effects of early experience on later behaviour and development in mice and rats. The relevant literature has been reviewed by a number of investigators (Ader, 1959; Beach & Jaynes, 1954; Bovard, 1958; King, 1958; Rosen, 1958a; Thompson, 1955). Apart from a few studies, the relationship between early social experience and later social behaviour has received very little attention in the literature.

The present investigation is concerned with the differential effects of group and solitary living on dominance behaviour in the adult rat. Kahn (1951) found that male mice raised in isolation from weaning were more aggressive than males raised with their mothers. Fredericson (1951) found that mice taught to compete for food before 35 days of age fought over food when 72 days old, whereas controls without the early competitive training did not fight. The hypothesis that an animal's early social experience affects his social behaviour as an adult was tested by King and Gurney (1954) in an experiment where groups of male mice were raised in different social conditions and then tested for aggression. The authors found inferior fighting in mice raised in isolation and suggest that there is a latent learning of aggression through the competitive association of mice raised in groups. Seitz (1954) raised groups of rats in which the litter was adjusted to 6 and 12 pups. He found that the rats raised in large litters during infancy tended to be more successful in competition than the rats reared in small litters. Seitz suggests that success in competition for food may have resulted from the fact that rats raised in large litters were exposed to more competition for food early in their lives, and from this experience developed greater skill and practice in competing.

The purpose of the present investigation was to examine the notion that an animal's social experiences significantly affect its social behaviour as an

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adult. The specific hypothesis tested was that rats raised in groups of two Ss each for three weeks following weaning would be more dominant in adulthood than those raised individually. Dominance, as employed in this study, refers to that behaviour which can be elicited only when there is competition for some goal object in which the need or drive activating the animal is congruent with the goal object, and can be satisfied by only one of the partners at a given time (Rosen, 1958b).

B. METHOD

1. Subjects

The Ss were 20 experimentally naive male albino rats (Wistar strain) obtained at age 21 days. The Ss were randomly assigned to one of two groups and housed in the Animal Laboratory, Department of Psychology, University of Toronto. Ventilation was controlled by a blower system, and the temperature was held constant at 78° F. The Ss were provided with an *ad libitum* diet of water and Master Fox Chow cubes from age 21 to age 57 days.

2. Apparatus

The Dominance Test Box was a 48 inches $\times$ 15 inches $\times$ 12 inches black wooden box with a wire-mesh lid. A metal drinking cylinder, 3 inches high and $1\frac{1}{4}$ inches in diameter, was fastened in the centre of the box. The opening of the cylinder was large enough to allow only one rat at a time to drink from it. The box was mounted on a table 3 feet above the floor of the experimental room. Illumination was provided by four lamps each consisting of two 40-w. fluorescent tubes. Two of the lamps were located 77 inches overhead and 48 inches to the right and left of the box.

3. Procedure

The experiment was divided into four distinct phases:

a. Social experience. The 10 experimental Ss (group living) were housed in five groups of two Ss each for 21 days following weaning in metal-mesh living cages. The original grouping of these Ss was randomized. The 10 control Ss (solitary living) were housed individually in identical cages. As dominance has been found to be related to post-weaning gentling (Rosen, 1958b), Ss received no handling during the experiment except that involved in moving five group-living rats to separate cages at age 42 days.

b. Drive cycle. Ss were maintained on a 23-hour water deprivation schedule from age 58 to age 81 days, a period of 24 days. Ss were allowed to drink tap water for 1 hour daily.

c. Familiarization. The familiarization period provided a transition to the dominance test period during which *Ss* were required to drink from the metal drinking cylinder in the Dominance Test Box. It also allowed the rat to explore and to become familiar with the inside of the box. The period began when *Ss* were 82 days old and ended when they were 93 days old, a period of 11 days.

Every morning each living cage was placed individually at one end of the apparatus. The cages were placed at the left end of the box on one day and at the right end on alternate days. An open metal living cage was always placed at the opposite end of the box. The cage door was opened and the wire-mesh lid lowered. Each *S* was allowed 5 minutes in which to leave its cage and to drink from the cylinder. After this drinking period, the cylinder was sealed. *E* then waited until *S* voluntarily returned to its cage. The cage was then returned to the laboratory and the drinking cylinder refilled with water for the next rat's period.

After all *Ss* received their turn in the Dominance Test Box, a metal container filled with tap water was placed inside the cage of only those *Ss* which had emerged from their cage to drink from the cylinder. By the fourth day, all *Ss* were emerging from their cages and entering the box. All *Ss* were then provided with water in their cages for 1 hour on the fourth, sixth, eighth, and tenth days of this period. Throughout the familiarization period, unlimited food was made available to all *Ss*.

d. Dominance test. The dominance test period began when *Ss* were 94 days old and ended when they were 104 days old. Each experimental *S* was paired once with each control *S*. Since it was paired once daily, each *S* had a total of 10 different pairings during this period. There were 10 different competitions each day and 100 during the entire testing.

The following procedure was used for the dominance tests. The living cage bearing an experimental *S* was placed at one end of the Dominance Test Box and the cage of the control *S* at the opposite end. The placement of cages was randomized for every pairing, as was the order of the pairings. Before each competition, the drinking cylinder was filled with fresh tap water and the floor of the apparatus cleaned.

The cage doors were opened simultaneously to permit each *S* equal opportunity to race toward the drinking cylinder and to fight for control of it. As the wire-mesh lid of the box was lowered, the 5-minute timer was set in motion. The length of time in seconds that each *S* spent drinking from the cylinder during the 5-minute period was recorded on individual Viking Standard timers by *E*. As the opening of the drinking cylinder was $1\frac{1}{4}$

inches in diameter, only one *S* at a time could drink from it. Dyes were used to facilitate recognition of the group- and solitary-living *Ss*.

Immediately after the completion of the competition, the lid of the box was raised and the cylinder sealed. The *E* then waited until the *Ss* voluntarily returned to their respective cages. After all the competitions were completed, a metal container of water was placed inside each living cage and *S* allowed a 1-hour drinking period.

C. RESULTS

The total time each *S* spent in drinking from the cylinder during all its pairings was divided by 10 to give a mean dominance time score for each *S*. These were then averaged for the two groups, GL and SL. Table 1 shows the group means and SDs. The difference between the group means is not significant ($t = .1428$; $df = 18$).

TABLE 1
MEANS AND STANDARD DEVIATIONS OF DOMINANCE TIME SCORES FOR GROUP-LIVING (GL)
AND SOLITARY-LIVING (SL) GROUPS

Group	N	Mean scores (sec.)	SD
GL	10	105.64	25.87
SL	10	107.86	38.53

D. DISCUSSION

The results of this experiment do not support the hypothesis that rats raised in groups of two *Ss* each for three weeks following weaning are more dominant in adulthood than those raised individually. The original hypothesis was formulated on the assumption (King & Gurney, 1954; King, 1957) that animals raised in groups occasionally compete for food, water, and space, and that early competitive training would facilitate their fighting behaviour in adulthood when placed in competition with solitary-living animals, who, supposedly, would lack this early competitive experience. Studies cited earlier employed groups of animals living together larger in size than those used in this experiment. Since in this study the number of experimental *Ss* living together was restricted to two per group, and since food and water were freely available at all times, it is reasonable to assume that fighting and competitive behaviour between pairs of rats was minimal. It may be hypothesized that the absence of any significant difference in social dominance between the group- and solitary-living *Ss* is attributable to the absence of any significant difference in early competitive experience. Occasional competition between pairs of group-living *Ss* was observed to

be more of a playful nature and not comparable to the fierce and aggressive fighting occurring during the dominance test period. During the drinking competitions, the *S* in control of the cylinder would be pushed, jabbed, and butted by its opponent in the attempt to displace it. Often this activity would culminate in vigorous fighting, and the box would be filled with the leaping, rolling, and bouncing bodies of the competitors. The vanquished animal would attempt to escape further punishment by running about the apparatus, or, if unsuccessful, would cower in a corner of one of the cages and submit to repeated jabs from the forepaws of the dominant *S*. The latter would then return to the cylinder to drink unmolested. After a severe defeat, a submissive animal would avoid the drinking cylinder even if the other rat was engaged in exploring the box.

The second assumption (King & Gurney, 1954; King, 1957) upon which the original hypothesis was based was that group-living *Ss* would not have to learn what another rat was when first confronted by a solitary-living *S* in the box. This early familiarization experience would tend to facilitate competition during the actual testing situation. A further assumption was that fighting behaviour of the solitary-living *Ss* would be inhibited by the strangeness induced by the sudden appearance of a competitor. Now King (1957) has found that mice separated by a screen mesh from their siblings show no difference in aggressive behaviour from those raised in contact with each other for the same period. The learning of competitive behaviour is hence not solely dependent upon actual physical contact between animals but can be acquired through perceptual cues obtained through close visual contact. In the present study, rats were housed in cages constructed of $\frac{1}{4}$ inch metal-mesh sides and top which were spaced 1 inch apart on the cage racks. Therefore it is suggested that the absence of a significant difference in adult dominance behaviour between the experimental and control *Ss* is attributable in part to the relatively equal opportunity of the *Ss* in both groups to become familiarized with one another either through actual bodily contact or through perceptual cues.

Although differences in the early social experience of the rats had no appreciable differential effects on *later* social behaviour, it does not discount the possibility that early group-living experience might have an *immediate* effect on social dominance. Further research is required to determine whether group-living animals are more dominant than solitary-living ones if tested shortly after the end of the experimental treatment. In terms of the present study, it is quite possible that the effects, if any, of the early social experience, did not persist into adulthood. In order to make any general statement con-

cerning the relationship between early social experience, in the form of group versus solitary living, and later social dominance, further detailed research is required. Some of the parameters which could be explored herein would be increasing the number of rats living together in each group, prolonging the duration of the group-living experience, and, decreasing the time interval between the end of the early social experience and the start of the dominance tests.

In conclusion, it is necessary to comment on the greater variability of the dominance time scores of the solitary-living group. This can be attributed to the dominance time score of a single animal who failed to control the drinking cylinder for any time during eight of the competition. This rat controlled the cylinder for some period of time during the first and fourth competitions but not during the second and third. This control *S* was severely beaten during the fifth competition by a very fierce and aggressive group-living animal. The control *S* failed during all subsequent bouts to control the drinking cylinder for any period of time even when its competitor returned to its own cage or was actively engaged investigating the apparatus. This animal would make repeated attempts to approach the cylinder but would soon withdraw to the confines of its cage without having sipped from the drinking cylinder.

E. SUMMARY

This experiment was designed to study the relationship between early social experience and later social behaviour. Rats living together in groups of two *Ss* each for three weeks following weaning were not found to be more dominant as adults than a control group of solitary-living animals. Dominance was measured by pairing each experimental *S* once with every control *S* in a series of five-minute competitive drinking situations. The findings were discussed in terms of the learning of competitive behaviour through actual physical contact with other rats and through the acquisition of perceptual cues. Recommendations for further research were presented.

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THE INFLUENCE OF EARLY SENSORY-SOCIAL DEPRIVATION ON THE SOCIAL OPERANT IN DOGS*¹

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A. THE EFFECT OF SENSORY DEPRIVATION

The effect of early sensory deprivation upon later perception has been studied by a number of investigators. Riesen (14) worked with a group of chimpanzees to determine the effects of visual deprivation upon later visual stimulation of locomotion and patterns. The animals which were early visually deprived showed marked retardation in visually controlled behavior. Clarke et al. (6) investigated the effects of early restriction of behavior upon social-emotional development in puppies. Puppies were raised in a normal and a restricted environment and were then tested in a variety of situations. In a strange environment, the restricted dogs explored much more than the normal dogs; and the restricted dogs also became much more excited at strange objects than did the dogs raised in a normal environment. Another series of studies which is pertinent here described so-called "social facilitation." The effect of social facilitation on food intake of puppies fed separately and together was measured by James and Gilbert (9). These investigators found that secondary reinforcements seemed to be produced in the social feeding condition specific to the feeding situation and that these secondary reinforcements seemed not to generalize from other social activities. Social facilitation of locomotor behavior has likewise been studied by a number of psychologists. Warner (15), Bruce (3), Lepley (10), Waters (16), and Angermeier, Schaul and James (2) all devoted their attention to this problem. The enhancing influences of visual exploration and reinforcement were investigated by Butler (4) Girdner (7), Montgomery (11), Butler and Harlow (5), Harlow and McClearn (8), and Myers and Miller (12). The great majority of these studies seemed to point toward some social facilitation of behavior in the respective experimental situations. Angermeier (1) demonstrated the social reinforcement values of visual, partial physical,

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and full physical contact with sex-like and sex-different social stimuli for albino rats raised in isolation and together. The major findings of this study were that the involvement of tactile receptors in a social situation early in life was largely responsible for the effectiveness of social reinforcement.

One of the foremost problems stemming from this investigation was the one concerned with the question whether socially reinforced behavior in an operant situation is influenced by early sensory deprivation which pertains only to social stimuli and not to the whole range of early sensory experiences.

This report is concerned with the influence of early sensory-social deprivation upon social operant behavior of dogs, reinforced by visual contact with breed-like, sex-like animals. Specifically, the experimental groups used were deprived of visual-social, tactual-social, and visual-tactual-social contact during a certain period of their early lives. Aside from social deprivation, the Ss' other experiences in sensory stimulation were not restricted.

B. METHOD

1. *Subjects*

Five male and four female Shepherd-type mongrel dogs were randomly selected from two litters of dogs. They were predominantly Shepherd, obtained from the City Pound of Athens, Georgia. In addition to these, three pure-bred male Beagle Hounds were used as Ss.

2. *Apparatus*

The apparatus consisted of a wooden box, covered by two wire-screen doors, and 22 by 24 by 65 inches long. The wooden box was divided into two equal parts by a Skinner-type work panel. One part of this box was used as the "work-box," the other one as the "social-display-box." On the side of the work-box, a wooden lever, 1.5 inches wide, 0.5 inches thick, and 4 inches long was affixed to the extreme right lower corner of the work panel, approximately 1 inch above the floor of the work-box. The work panel consisted of a wooden partition, into which was inserted a "guillotine-type" plastic door between two layers of wire-screen on either side of the work panel. The plastic door was eight inches wide and 10 inches high and painted black, so as to prevent the animal in the work-box from looking into the social-display-box without having pressed the lever. When the animal pressed the lever, a microswitch was activated which permitted the guillotine door to be lifted by an electric motor. Through a system of relays and an electric variable delay timer, the door was held in the upward position for a period of 10 seconds, and fell then back to its original position. This

permitted the work animal to see the social display animal for a fixed period of 10 seconds, following each manipulation of the lever. At the same time, a kymograph registered the animal's responses.

3. Procedure

All the animals were separated from their mothers at 60 days of age. They were then divided into four groups of three animals each. The three pure-bred Beagle Hounds were assigned to Group I. This group was reared together. The other animals were randomly assigned to the three other groups. Group II contained one male and two female animals, which were reared so that they could see, but not touch each other. Group III contained three male animals which could touch, but not see each other. These animals were raised in a dark box. Group IV, containing one male and two female animals, was raised so that the animals could neither see nor touch each other. These animals were reared in individual isolation cages. An attempt was made to keep the lighting conditions as stable as possible for all the groups, except for Group III which was reared in the dark box. The animals which served as social display animals were reared apart from all four groups. They were a male and a female animal, reared together during the first 90 days of life. When the experimental animals were 90 days of age—having been assigned to the groups of sensory-social deprivation for 30 days following weaning—the animals were tested in the apparatus. The experimental sessions were given on 15 consecutive days and lasted 20 minutes each. During these sessions, all animals were put singly in the apparatus and were reinforced by visual contact with another animal of the same breed and sex for 10 seconds following each bar press. The pure-bred Beagle Hounds served thus as reinforcement for each other, since there was no other dog of this species available to act as social reinforcement. The reinforcement was continuous during the experimental sessions and only available after the animal had pressed the lever. No approach training was given. Following the experimental sessions, one 20-minute extinction session was administered to all animals. A summary of the experimental design can be seen in Table 1.

C. RESULTS

Two of three animals learned the response in both, the non-deprived group and the group deprived of visual-tactual-social contact. Only one of three animals learned in the visual-social and tactual-social deprivation groups.

An analysis of variance computed for possible effects of the treatments revealed no statistically significant differences, as far as acquisition was con-

cerned. The same was true for possible differences in extinction frequencies. All the F-ratios are summarized and shown in Table 2.

A *Chi-square* test showed no statistically significant difference in the number of animals learning the task in the four groups of varying degrees of sensory-social deprivation. *Chi-square* for 3 *dfs* was 3.33.

TABLE 1
SUMMARY OF EXPERIMENTAL DESIGN

Animals	Conditions	Reinforcement
All	Reared with mother—60 days	N/A
Group I	Visual and tactual contact—30 days	N/A
Group II	Visual contact only—30 days	N/A
Group III	Tactual contact only—30 days	N/A
Group IV	No visual or tactual contact—30 days	N/A
Groups	Fifteen 20-minute sessions of visual	
I	Contact with breed-like, sex-like	10 sec.
II	Social display animal	Continuous
III		
IV		
All	One 20-minute extinction session	None

A correlation coefficient (*r*) of .86 was obtained between the acquisition and extinction frequencies of all the groups. The coefficient was found to be significant beyond the .01 level.

TABLE 2
ANALYSIS OF VARIANCE SUMMARIES

Source	df	SS	MS	F ^a
<i>Acquisition frequency:</i>				
Between Ss (same group)	3	28103.12	9367.71	1.07
Between groups	8	68553.87	8569.23	0.98
Total between Ss	11	96656.99	8786.99	
Between trials	14	24473.78	1748.13	1.35
Trials $\times$ groups	42	40699.15	969.03	0.75
Ss $\times$ trials (pooled)	112	152060.94	1357.69	1.05
Total within	168	217233.87	1293.06	
Total variance	179	313890.86		
<i>Extinction frequency:</i>				
Between groups	3	15321.00	5107.00	0.57
Between Ss	2	11886.00	5943.00	0.67
Ss $\times$ groups	6	53314.00	8885.67	
Total variance	11	80521.00		

^a None of these are significant.

These results seemed to indicate that sensory restriction in only one aspect of the early life in a dog—social contact—did not influence later social operant behavior, reinforced by visual contact, appreciably. It seemed from

the data that either the sensory restriction would have to encompass a greater part or the entire range of sensory experiences in the particular sensory area, or that the period of sensory-social deprivation of 30 days was not long enough to produce any basic behavioral changes. When the data obtained from this study were compared with Riesen's (13) results, and those reported by Clarke et al. (6), Thompson and Melzack (14), and Angermeier (1), it seemed that they favor an explanation in terms of period of deprivation. Another way of explaining the results would be to hypothesize the possibility of a "critical period" in the life of a dog, during which this type of behavior becomes conditioned, regardless of previous experience or restriction. It seemed, however, that consideration of the degree of deprivation is not ruled out by this explanation. Further research on the problem from this particular viewpoint seems to be warranted.

D. SUMMARY

This study was designed to study the effects of a short-term sensory-social deprivation, which pertained only to social contact, upon social operant behavior in dogs, reinforced by seeing another dog. Four groups of animals were separated from their mothers at the age of 60 days. One group was non-restricted, one group was given visual-social restriction, another group tactual-social restriction, and the last group both visual-tactual-social restriction. When all the animals were 90 days of age, they were tested in a Skinner-type apparatus, in which they could see another dog of the same breed and sex for a 10-second period after pressing a lever. An analysis of variance computed for acquisition and extinction frequencies showed no significant statistical differences. The differences between number of animals learning the response was measured with a *Chi-square* test and also found non-significant.

The following conclusions seem to be warranted:

1. A 30-day sensory-social deprivation period does not create any significant differences in the development of social operant behavior of dogs.
2. In order to create such a difference, it is suggested that the period of sensory-social deprivation should be prolonged, and also that sensory deprivation be extended to other sensory areas.
3. There may be a "critical period" in dogs, as was found in certain birds, during which this type of behavior becomes conditioned, regardless of previous experience and restriction.

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PERSONALITY CHARACTERISTICS OF THE MOTHERS OF AGGRESSIVE AND UNAGGRESSIVE CHILDREN*

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A. IN A RECENT STUDY

In a recent study Sears, Maccoby, and Levin (1957) have made an important contribution to our knowledge of the way in which methods of discipline adopted by mothers in bringing up their children affect the personality of the child. As far as the child's aggression is concerned, two dimensions of maternal attitude emerged as having a significant effect, namely (1) the degree to which the mothers used physical punishment to try to stop their children's aggression: the effect of physical punishment appears to be to increase the amount of aggression the child displays; (2) the amount of permissiveness the mothers allow towards their children's aggressive behaviour: here it appears that permissiveness of aggression increases the child's aggressiveness.

The present paper reports an investigation whose object is partly to throw light on the possibility that an inheritance factor could account for the Sears findings and partly to integrate Sears' work with the general personality theory advanced by Eysenck (e.g., 1954, 1957). It is evident that if a mother's punitiveness towards aggression or permissiveness of it are related to the personality dimensions underlying aggression, then the possibility that Sears' findings are due to inheritance becomes an important one. It is here that the work of Eysenck has a bearing on the problem, since he has done something to isolate the personality dimensions related to aggressive behaviour. In this work, Eysenck (1954) and his associates have shown that aggression is related to the personality dimension of introversion-extraversion, in that aggressiveness and extraversion are associated. This work has been confirmed by the present writer (Lynn, 1959), who has also found some evidence that aggression is negatively correlated with the personality dimension of neuroticism. These findings, taken together with the evidence from twin studies that individual differences in extraversion and neuroticism are determined to a considerable extent by heredity (Eysenck and Prell, 1951; Eysenck, 1956; Shields, 1958), suggest that the tendency to develop

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aggressive techniques may be substantially determined by the inherited constitutional factors of introversion-extraversion and neuroticism.

The possibility that these factors may underlie the findings of Sears and his associates can be tested in the following way: if a mother's punishment of aggression (or permissiveness of aggression) is simply a reflection of her own tendencies to behave aggressively in general, then mothers who score high on punishment of aggression (or permissiveness of aggression) should be extraverted or emotionally stable or both. The present paper reports an investigation designed partly to examine this question and partly to repeat the Sears study using more objective techniques of measurement.

B. THE INVESTIGATION

1. *The Subjects*

The children were the entire population of two village schools in Devon, age range 7-11, $N = 108$. Their mothers were invited to special meetings of the parent-teachers' association at which 48 mothers were tested.

2. *Procedure*

The children were assessed for aggressiveness on a five point scale by two teachers from each school and the scores summed to give an aggression score. As far as the mothers are concerned, extraversion and neuroticism was assessed by the Maudsley Personality Inventory and attitudes of punishment and permissiveness towards children's aggression by two scales devised by Sears. These scales are in the form of statements mothers are alleged to have made about dealing with aggression from their 5-year-old child, and S has to record agreement or disagreement with the mother's attitude on a five point scale. For example, the first statement of the permissiveness scale was "I want my children to know right from the start that it's wrong to disobey their parents." In the present investigation Sears' punishment of aggression scale has been divided into those statements specifically involving physical punishment and those where some other form of punishment is implied. The physical punishment statements are numbers 8, 10, 11, and 13 in Sears' scale, and the first of these was: "When Jim loses his temper, I just give him a good paddling on the rear—this is something he won't forget." This scale is here called the physical punishment scale.

3. *Results*

The product-moment correlations between the variables measured are set out in Table 1.

C. DISCUSSION OF RESULTS

Sears' finding of a positive correlation between a mother's use of physical punishment and the aggressiveness of the child is clearly confirmed at a significant level. The present finding further does something to dispel criticisms of some of the technical aspects of the Sears study, namely the use of

TABLE 1
PRODUCT-MOMENT CORRELATIONS BETWEEN DIMENSIONS OF MOTHERS' PERSONALITY,
ATTITUDES TO CHILD REARING, AND THE CHILD'S AGGRESSION

	r
Mother's physical punishment $\times$ child's aggression	+.36*
Mother's non-physical punishment $\times$ child's aggression	-.16
Mother's permissiveness $\times$ child's aggression	+.07
Mother's physical punishment $\times$ extraversion	-.31*
Mother's non-physical punishment $\times$ extraversion	-.28*
Mother's permissiveness $\times$ extraversion	+.08
Mother's physical punishment $\times$ neuroticism	+.38*
Mother's non-physical punishment $\times$ neuroticism	+.29*
Mother's permissiveness $\times$ neuroticism	-.03
Mother's extraversion $\times$ child's aggression	+.39*
Mother's neuroticism $\times$ child's aggression	-.17

* Significant at the .05 level.

the mothers' own comments for the assessment of the aggressiveness of the children and their own attitudes to it; there is a possibility that punitive mothers may have regarded their children as more aggressive without the children being so in objective fact. The present finding of a correlation using fully objective and independent measures of the child's aggression adds confidence to the Sears finding.

The findings concerning permissiveness do not confirm the Sears results so well. The mothers' scores on the permissiveness scale have virtually no correlation with the child's aggression. It is possible that the non-physical punishment scale is really a permissiveness scale (e.g., the first item of the scale was: "Yesterday Mark deliberately dumped a box of soap on the floor, and I decided the best way to handle it was to call off our afternoon walk") but in view of Sears' method of assessing permissiveness by expert evaluation of tape recorded conversations with the mothers it is impossible for the independent investigator to be certain of the exact implications of the term. However, assuming that the non-physical punishment scale is a permissiveness scale in Sears' sense, it is perhaps worth noting that the correlation obtained is in the expected direction (i.e., permissiveness produces aggression) and that it is of the same sort of size as Sears' own correlation of +.23. In so far as the present findings fail to confirm Sears', two

explanations can be suggested: first, the different techniques for assessing permissiveness in the two studies; secondly, Sears assessed aggression in the home, while in this study the teachers were necessarily assessing aggression at school. It is possible that the permissively reared child is aggressive to his parents but not to other children. If this were so, the difference between the findings of the two studies would be explained. There is, however, a third point that should be noted: namely that permissive mothers tend to be extraverted and non-neurotic. If the correlations of the mothers' extraversion and neuroticism with the non-physical punishment scale and the child's aggression are partialled out, the partial correlation of non-physical punishment with child's aggression falls to .00. Since extraverted and stable mothers will tend to have aggressive children by virtue of inheritance, it is evidently important to control the hereditary variable if permissiveness is to be established as an important environmental influence.

The child's aggressiveness correlates positively and significantly with the mother's extraversion as would be expected from Eysenck's theory linking aggressiveness with extraversion and his work demonstrating an important inherited factor determining introversion-extraversion. The most striking finding of the investigation, however, is probably the tendency of introverted and neurotic mothers to be more punitive towards their child's aggressiveness. It appears that here is an exception to the general non-aggressiveness of the introvert and the neurotic; presumably introverted and neurotic mothers are more disturbed by signs of aggressiveness in their children and are willing to use greater degrees of physical punishment to achieve (as they think) the greater good of socializing their children to the level of their own high standards.

This finding has two important implications. In the first place, it suggests that Sears' correlation between the mother's punitiveness and the child's aggression cannot be explained by inheritance, since on the inheritance hypothesis the punitive mothers should be extraverted and stable whereas in fact the reverse is the case. It looks therefore as if the amount of punishment of aggression the mother imposes is a genuine environmental variable affecting the aggressiveness of the child.

Secondly, it appears that typically the inheritance factor and the amount of punishment for aggression imposed by the mother work against one another in determining the level of aggressiveness of the child, e.g., a child of an introverted and stable mother will tend to be unaggressive by virtue of his inheritance but aggressive as a result of the high standards of socialisation imposed on him. This suggests that the correlation of the mother's

punitiveness and the child's aggressiveness should rise when the correlation of both with the mother's extraversion and neuroticism is partialled out: and in fact the partial correlation is $+.69$. The present investigation suggests therefore that the highly aggressive child is a product of three factors, the two constitutional factors of extraversion and emotional stability and the environmental factor of the degree of physical punishment imposed by the mother; and furthermore that it is only atypically that the environmental factor acts in conjunction with the constitutional ones.

D. SUMMARY

Sears, Maccoby, and Levin (1957) have reported that the aggressive behaviour of the child is related positively to the mother's use of physical punishment and her permissiveness of aggression. The present paper reports an investigation designed (1) to repeat this study on English school children using objective and independent measures of aggression and mothers' attitudes; and (2) to test the possibility that the Sears' findings could be due to the inheritance of aggressive tendencies mediated by the personality dimensions of introversion-extraversion and neuroticism.

The following results were obtained: (1) there is a significant tendency for high punishing mothers to have aggressive children and a less clearly marked tendency for permissive mothers to have aggressive children; (2) when the personality dimensions of introversion-extraversion and neuroticism are partialled out, the correlation between the mother's use of punishment and the child's aggression rises substantially but the correlation between the mothers' permissiveness of aggression and the child's aggression falls to zero. The results suggest therefore (1) that Sears' physical punishment factor is a genuine environmental influence determining the level of aggression of the child, but (2) that the maternal permissiveness factor could easily be a reflection of constitutional tendencies and needs to be more clearly established if it is to be accepted as an independent environmental influence.

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Crossmead

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A CONSTRUCT VALIDITY STUDY ON A LEADERSHIP
AND A SOCIAL INSIGHT TESTS FOR 200
COLLEGE FRESHMEN STUDENTS*

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RUSSELL N. CASSEL

This study was concerned with making comparative analyses between scores on two experimental tests of leadership and social insight, and other test scores and data for the same 200 freshmen students at Phoenix College. The other test scores were in the areas of scholastic aptitude and scholastic achievement, and the other data included grade point average (GPA), number of credits matriculated for, and chronological age.

A. TESTS AND DATA

1. *Experimental Tests*

a. Leadership decision pattern. The Leadership Ability Test (4, 5, 6, 7, 8, & 9) was utilized. It is made up of 50 items, each of which constitutes a small leader-group type situation in which the subject taking the test is asked to elect one of four choices as a means of influencing persons or groups in his role as a leader. Each of the four choices provided represent a different leader decision structure, and constitutes one of the four part scores on the test: Part I—laissez faire, an individual group member centered decision structure, Part II—democratic cooperative, a parliamentary procedure centered decision structure, Part III—autocratic submissive, a resource person centered decision structure, and Part IV—autocratic aggressive, an ego centered decision structure. The Total Score represents the weighing of the part scores that discerns optimumally between outstanding individuals based on leadership achievements, and typical individuals.

b. Social insight. The Test of Social Insight (3, 4, 5, 6, & 8) was used. It contains 60 items each of which represents a social problem which the person taking the test is asked to solve in a certain way. The five multiple choice answers each represents one of the five part scores on the test, and they are defined as follows: Part I—withdrawal, Part II—passivity, Part III—cooperation, Part IV—competition, and Part V—aggression. The Total Score represents over-all social insight, and it is based on the

* Received in the Editorial Office on December 7, 1959.

best weighting of the five part scores that discerns optimally between persons in a correctional institution and typical individuals.

2. Construct Validity Tests and Data

a. College aptitude. The Cooperative College Ability Test (Forms 1a and b) were used. An expected achievement index (XA) was computed on the basis of Beta weights ($2\frac{1}{2} \times \text{verbal score} + 1 \times \text{quantitative score}$) developed by correlation the two part scores against the average of three Cooperative achievement tests (reading, English, and mathematics).

b. Scholastic achievement. Three different college achievement tests were utilized, and in each test the total score was the index: (1) Cooperative English C2, Reading Comprehension Form Z Test, (2) Cooperative English C2 Mechanics of Expression, Form Z Test, and (3) Cooperative College Pre-test for Mathematics Form Y Text. From the three total scores of referenced tests an average score was computed.

c. Grade point average (GPA). The index was computed by taking the average of student's marks for all courses enrolled in for the 2nd semester of the 1958-59 school year, the period during which this study was conducted.

d. Number of credit hours. This is the number of semester hours of credit for which individuals who were involved in this study were enrolled in during the 2nd semester of the 1958-59 school year. All students but five of the 200 in the study were enrolled in full study programs.

e. Chronological age. The individuals age to the nearest six months.

B. GROUPS

The total female population of six available freshmen general psychology classes was used; while the total male population of three and approximately a half classes was utilized. A check against the intelligence and age of the individuals in the study indicates that both the male and female groups are representative and characteristic of the total day school freshmen population registered for the 2nd semester of the 1958-59 school year at Phoenix College.

The two experimental tests were administered by the respective faculty members, but always with the concurrence of all students involved. The ability and achievement tests were administered as a portion of the regular college guidance testing program, and near the beginning of each semester for newly registered students.

C. FINDINGS

1. Construct Validity for Leadership Decision Pattern

From the data in Table 1 the evidence indicates that the Total Score on

The Leadership Ability Test is significantly related only to grade point average (GPA). This means that the students with the highest teacher marks in all college classes during this study were the ones, in general, to

TABLE 1
CONSTRUCT VALIDITY ON THE LEADERSHIP ABILITY TEST (LAT)

Construct data	Number	Correlation with LAT total score	Mean	Standard deviation
<i>Average cooperative achievement tests scores—Read., English, & math.:</i>				
boys	100	.078	50.68	7.54
girls	100		54.42	12.61
total	200		51.93	9.70
difference			3.74	
t value			*2.56	
<i>Grade point average 2nd semester 1958-59:</i>				
boys	100	**-.188	2.73	0.61
girls	100		2.32	0.76
total	200		2.59	0.69
difference			0.41	
t value			**4.22	
<i>School and college ability test—expected achievement score:</i>				
boys	100	.014	101.5	6.27
girls	100		103.2	6.42
total	200		102.1	6.44
difference			1.7	
			1.91	
<i>Test of social insight—Total score, overall social insight:</i>				
boys	100	— .062	21.11	5.46
girls	100		15.64	4.28
total	200		19.35	5.70
difference			5.47	
t value			**7.93	
<i>Semester hours of credit carried 2nd semester, 1958-59:</i>				
boys	100	.094	14.63	2.73
girls	100		15.62	3.14
total	200		14.95	2.91
difference			0.99	
t value			*2.41	
<i>Chronological age (nearest 6 months):</i>				
boys	100	.047	21.13	3.23
girls	100		20.10	7.00
total	200		21.08	4.83
difference			1.03	
t value			1.33	

*Significant at 5 per cent level.

**Significant at 1 per cent level.

receive leadership decision pattern scores most like the norms for typical individuals; rather than the norms for outstanding leaders.

The leadership decision pattern score appears to be unrelated to such factors as: scholastic achievement, expected achievement, number of semester hours of credit carried, chronological age, and social insight.

It should be noted that there was no sex difference in terms of the leadership decision pattern score, for subjects involved in this study.

2. *Construct Validity for Social Insight*

From the data in Table 2 the Total Score on The Test of Social Insight is related significantly to the following at the one per cent level of statistical confidence: scholastic achievement, grade point average, and expected achievement. It is related to number of semester hours of credit being carried to the five per cent level of statistical confidence.

Over-all social insight, as measured by the Total Score on the TSI appears to be unrelated to: leadership decision pattern, and chronological age.

It should be noted that there is a marked statistically significant difference between the over-all social insight for the male and female students involved in this study, and with the better social insight in favor of the female subjects.

D. SUMMARY

This study was concerned with making comparative analyses between the scores on two experimental tests of social insight and leadership, and scores on tests of college ability and achievement, and grade point average, number of credits being carried, and age for 200 college freshmen students who were enrolled in six available day classes in general psychology at the Phoenix College during the second semester of the 1958-59 school year. In terms of ability and age, the students involved were representative of day-school Phoenix College students.

The Total Score on The Leadership Ability Test is significantly related only to grade point average, and in a negative direction; so that the students receiving highest grades obtain the most ineffective leadership decision pattern scores. Similarly, the leadership pattern score is unrelated to expected achievement, scholastic achievement, social insight, semester hours of credit enrolled in, and chronological age of student.

The Total Score on the Test of Social Insight is significantly related to scholastic achievement, grade point average, expected achievement, and number of semester hours of credit carried. It is unrelated to chronological age.

College students are considered to be a rather select population in terms of

being higher in intellectual capability than the typical individual from random samples of the population, and one would not necessarily expect similar construct relationships with the same data from unselect groups of individuals.

TABLE 2
CONSTRUCT VALIDITY ON THE TEST OF SOCIAL INSIGHT (TSI)

Construct data	Number	Correlation with TSI Total Score	Mean	Standard deviation
<i>Average cooperative achievement tests scores—read., English, & math.:</i>				
boys	100	**.245	(Same as Table 1)	
girls	100			
total	200			
difference				
total				
<i>Grade point average 2nd semester 1958-59:</i>				
boys	100	**.294	(Same as Table 1)	
girls	100			
total	200			
difference				
t value				
<i>School and college ability test—expected achievement score:</i>				
boys	100	**.180	(Same as Table 1)	
girls	100			
total	200			
difference				
t value				
<i>The leadership ability test—total score, leadership decision pattern:</i>				
boys	100	—.062	12.52	2.25
girls	100		12.89	2.39
total	200		12.64	2.30
difference			0.37	
t value			1.12	
<i>Semester hours of credit carried 2nd semester, 1958-59:</i>				
boys	100	*.157	(Same as Table 1)	
girls	100			
total	200			
difference				
t value				
<i>Chronological age (nearest 6 months):</i>				
boys	100	.028	(Same as Table 1)	
girls	100			
total	200			
difference				
t value				

*Significant at 5 per cent level.

**Significant at 1 per cent level.

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CHANGE IN SENSE MODALITY AS A FACTOR IN RETROACTIVE INHIBITION*

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A. INTRODUCTION

Approximately a quarter of a century ago Nagge (1) reported that if subjects learn a set of nonsense syllables by looking at them, then auditory presentation of a second set produces less retroactive inhibition than does visual presentation of the second list. Nagge's results also show that if the original list is heard but not seen by the Ss, visual presentation of the interpolated list produces less retroactive inhibition.

Nagge's experiments support the hypothesis that retroactive inhibition is reduced when the interpolated task and the original material involve different sense modalities. However, the published results give direct support to the hypothesis only when it is applied to audition and vision. The present paper reports what seems to be the first test of the hypothesis as it applies to other sense modalities.

Although the experiment reported here was conducted primarily because of its empirical value, it stemmed in part from a study by Thompson and Bryant (3). In the study, rats learned a visual discrimination problem and then were divided into two groups; one group was retention in a lighted room while the other group was in a dark room. A retention test revealed that the rats which had been in the lighted room performed more poorly than did the other animals.

In discussing their study, Thompson and Bryant said their findings supported a perseveration type of learning theory, and they implied that the perseveration takes place in different parts of the brain when different sense modalities are predominant in the learning. Their implications have been extended by Overton (2), who suggested that the extent of similarity between two stimuli may be related to the extent of overlap between patterns of neural activity set up by the two stimuli. According to this suggestion, reduced retroactive inhibition as a result of a change in sense modality could be attributed to reduced similarity between the original

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and the interpolated tasks. In the specific case of the Nagge study, an interpolated nonsense syllable which is heard is presumably less similar to an original syllable which was seen than is an interpolated syllable which is seen.

In summary, there are at least two justifications for tests of the hypothesis that change in sense modality is a factor in retroactive inhibition. First, the tests would have intrinsic empirical value. Second, they would contribute to theorizing regarding broader aspects of learning and similarity.

B. METHOD

1. *Subjects*

The *Ss* were 34 male and 26 female students from Fort Hays Kansas State College. The *Ss* ranged in age from 18 to 36 years, with a mean of 22.1.

2. *Apparatus*

The materials used included a tape recorder, and a training and testing device. (The *S's* task was to learn a sequence of lefts and rights.) The apparatus was mounted on a table which was divided in half by a 3' $\times$ 4' partition. Located near the middle of the table were two levers on which the *S* placed his hands and received kinesthetic stimulation. A detailed schematic drawing of this device is shown in Figure 1. There were also a small pencil flashlight for illumination, answer forms, and instruction sheets. Two forms were used for reporting. Half of the *Ss* used Form A and the other half used Form B. The two forms were alike in that they both consisted of two rows of eight *Rs* and eight *Ls*. In Form A the *Rs* were listed on the left side of the page and the *Ls* on the right. In Form B the rows were interchanged. The purpose of using the two different forms was an attempt to prevent transfer from the learning situation, by the kinesthetic group, to the reporting of the sequence. The method of reporting the sequence entailed the circling of *R* for right and *L* for left.

3. *Procedure*

Each *S* was seated at the opposite end of the table from *E*. A copy of the instructions was given to *S* to follow while *E* read the instructions aloud. The instructions for all *Ss* were:

You are to be subjected to a simple learning situation. It is not a personality test. You are asked to do the best you can.

The *Ss* who were to learn by audition were then told:

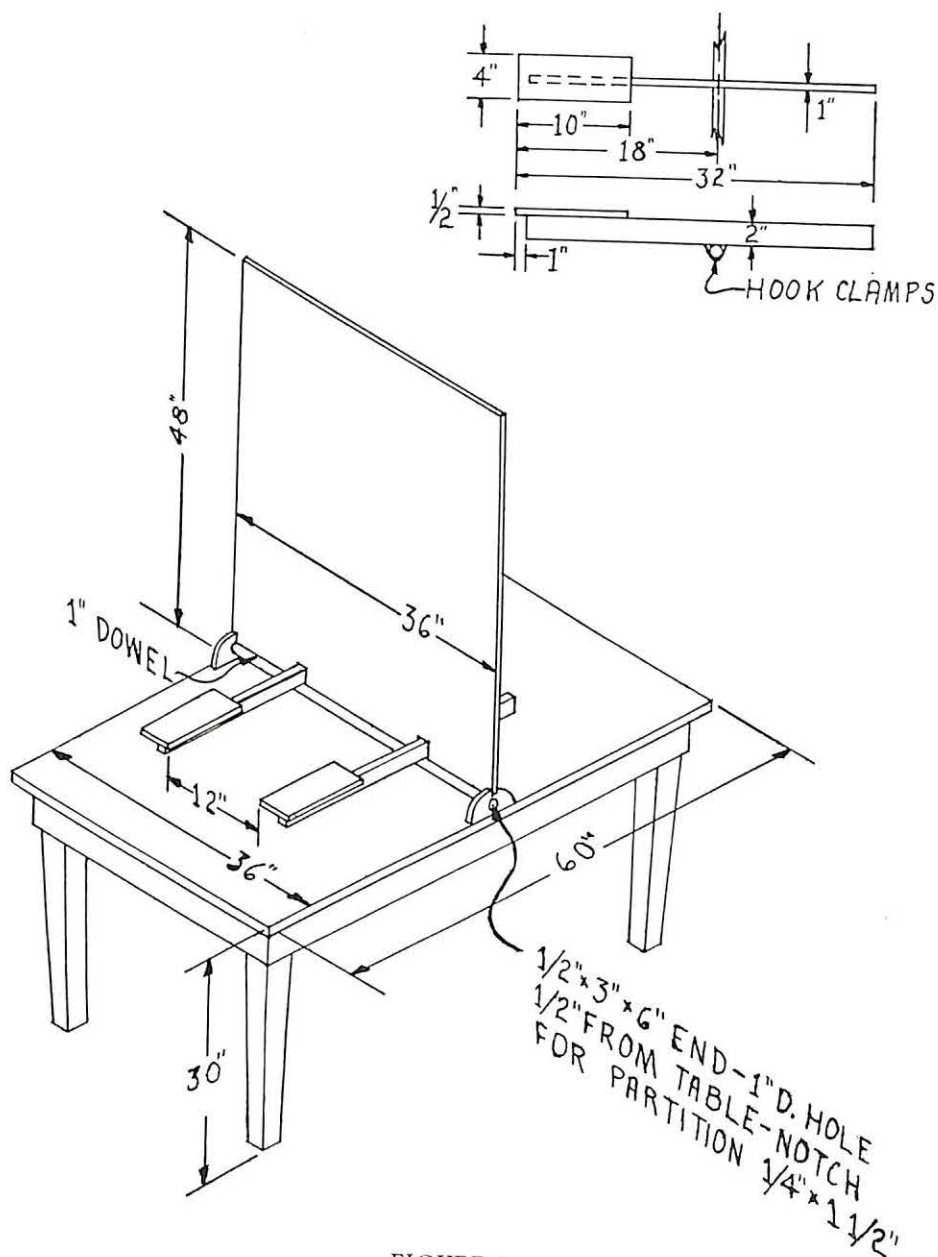


FIGURE 1
KINESTHETIC STIPULATING DEVICE

You will hear a sequence of lefts and rights, only one time. At the end of the presentation you will be asked to report the correct order of the lefts and rights which you learned. Please place your hands on the pedals in front of you."

The *Ss* who were to learn through kinesthesia and tactual stimulation were told:

You will be given a sequence of lefts and rights to learn. You will be given this sequence only one time, and at the end of the presentation you will be asked to report the correct order of those lefts and rights. Please place your hands on the pedals in front of you.

After each *S* had correctly placed his hands on the pedals, the room lights were turned off. The room was then in total darkness except for a small beam of light from a flashlight which the *E* used. The learning sequence was then presented to the *S*. For those *Ss* who were to receive interpolated material, the interference described below was given two seconds after the sequence was terminated. The rights and lefts in the sequence which the *Ss* were to learn were presented at intervals of two seconds. The sequence to be learned was as follows: L—R—R—L—R—L—L—R. The interference used was a tape recorded scream or an abrupt jar on both pedals of the kinesthetic stimulating device.

The auditory stimulation was accomplished by use of the tape recorder. The kinesthetic stimulation was presented by lifting the *Ss* hands, which were on the pedals, in the correct sequence.

The *Ss* were combined into six groups of 10 *Ss* each. The groups formed a 2×3 analysis of variance type of design in which the variables were method of original learning (auditory vs. tactual kinesthetic) and type of interpolated material (auditory vs. tactual kinesthetic vs. no interpolated activity).

Each *S* reported his recall of the sequence on a form answer sheet. The reason for the use of this visual reporting device was an attempt to prevent any transfer from the learning of the sequence to the reporting of the sequence.

4. Scoring

The *S's* score was the number of correct responses prior to his first mistake. Thus, scores could range between 0 and 8.

C. RESULTS

Table 1 summarizes the results, which were analyzed by an analysis of variance. Table 2 summarizes the statistical analysis.

The interaction is significant at better than the .01 level of confidence. This significance supports the hypothesis that retention is decreased when interpolated material is presented in the same sense modality as the original learning material.

TABLE 1
MEANS AND VARIANCES OF THE SUBJECTS OF THE SIX GROUPS

Type of Interpolated Activity		Type of original learning	
		Auditory	Kinesthetic
Type of Interpolated Activity	Auditory	$m = 3.7$ $s^2 = 5.210$	$m = 5.6$ $s^2 = 4.144$
	Kinesthetic	$m = 6.3$ $s^2 = 4.410$	$m = 3.2$ $s^2 = 5.136$
	None	$m = 5.9$ $s^2 = 4.890$	$m = 5.6$ $s^2 = 6.080$

TABLE 2
SUMMARY OF ANALYSIS OF VARIANCE

Source	Est. ²	df	F
Between rows	7.410	2	1.489
Between columns	3.780	1	.759
Interaction	31.410	2	6.310*
Error	4.978	54	

* Significant at better than the .01 level.

D. DISCUSSION

The experiment provided further evidence to support the generalized hypothesis that retroactive inhibition is reduced when interpolated and original materials are presented in different sense modalities.

The data, of course, does not provide crucial evidence for a perseveration theory of learning. However, they may be explained most easily by such a theory.

Another approach to the interpretation of the data would be to make the assumption: The more similar the original and the interpolated material, the greater the retroactive inhibition. If such an assumption were accepted, the present study could be viewed as an attempt to define "similar" operationally.

E. SUMMARY

The present study was designed to provide further evidence regarding this hypothesis: When original learning and interpolated material are presented via different sense modalities, retroactive inhibition is reduced. Previous studies had tested the hypothesis only with vision and audition.

By using auditory and kinesthetic sense modalities in presenting original learning and interpolated material to 60 Ss, results were found which supported the hypothesis as applied to those sense modalities. Therefore, the results also support the general hypothesis that retroactive inhibition is reduced when the interpolated task and the original material involve different sense modalities.

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BOOKS

Now that there is a special APA journal completely devoted to the publication of book reviews, it is no longer necessary that other journals emphasize such publication. It has always been our conviction that book reviews are a secondary order of publication unless they carry information that is as equally important as the book. However, the publication of book titles is a very important service, and we shall continue to render that service.

In any given issue of this journal, we may continue to publish one or more book reviews, but we do not consider such publication a major function of this journal. In line with this policy, we can no longer pay for such manuscripts.

(Neill, A. S. *Summerhill: A Radical Approach to Child Rearing*. New York: Hart Publishing Co., 1960.)

REVIEWED BY E. LAKIN PHILLIPS

This book is one among those now making up a long series of publications on child behavior and treatment by psychoanalytically inclined writers. Whether this book is any different from those of the other psychoanalytic writers—from Anne Freud and Melanie Klein to the present—is disputable. Although the sub-title indicates a “radical” approach, it is hardly this, either in terms of radical meaning going-to-the-root of a problem, or radical as a deviational (but not necessarily invidious) viewpoint. Certainly the book is not different from what one would expect to find, given the general viewpoint of the author.

Neill's thesis is a familiar one; in fact, the modal or “popular” one today—viz., that the emotional disturbance of children is due to parental failure to offer freedom to the child to develop his natural inclinations. Frustrations, adult imposed, stifle growth, beget resentments, and develop many types of educational, psychological and social-emotional ills. An alternative view, namely, that the child may, indeed, have or demand too much freedom and unilaterality—which would allow him to over-extend himself and run amok in society or be unusually vulnerable to failure—is not even mentioned by the author.

Summerhill has been in operation for several decades. Perhaps only a few hundred children have been in residence, and only a few dozen appear to be there at any one time. However, Neill gives no clear cut set of

figures on population, turnover, length of stay, nature of problems (not even a listing of "presenting complaints"), age distribution, etc. He has one chapter purporting to give follow-up data, but only ten children are specifically mentioned.

Neill decries all manner of regulation, structure, and order.

He states:

My view is that a child is innately wise and realistic. If left to himself without adult suggestion of any kind, he will develop as far as he is capable of developing. (p. 4)

Neill's opinion is one thing—a matter to which he is personally entitled—but in presenting a work on education and on child rearing, he might well be called upon to support his viewpoint with more than the many-fold assertions sprinkled throughout the book, like the one quoted above. In a positive sense the literature from comparative cultures and from the recent emphasis on "programming" in learning; and in a negative sense, the poor results from residential treatment centers and generally permissive child rearing and child treatment practices; all tend to disconfirm his bold statement.

It is true that children often need time and space in which to work out many of their problems—educational, social, psychological—and that if adults do not "worry" them too much, children will often surprise the on-looking and over-anxious adult with the caliber of their decisions and actions. However, such fortunate outcomes from freedom are not as common as we would like, and apparently depend upon a pretty well organized and devoted problem-solver in the first place. Freedom is for the already well-controlled person. Neill, as well as most others it would seem, fails to differentiate between the degrees of structure needed for effective problem-solving among handicapped vs. normal learners. Failure to impose control, structure, limits on one's self is an indication of emotional disturbance; if it cannot come from "inside," the limit-setting has to come from the social and interpersonal environment. It has never been demonstrated as far as this reviewer knows that so-called freedom in the sense in which Neill uses the term can produce effective problem solving. At best, this is an area requiring and inviting considerable research which Neill and most of the psychoanalytically oriented thinkers gloss over with amazing indifference.

In many ways, Professor Neill is anti-intellectual. He eschews hard work in learning and in so doing goes against the record of most high

level achievers in the intellectual history of mankind. He seems to feel that his type of school would inspire creativity and achievement, but I strongly suspect that were his program to prevail in the schools of our nation, as well as in other nations, we would produce even more misfits than we now regretfully turn out. If I read the times correctly, parents and teachers and even clinicians (sic!) are turning away from the excessively permissive child rearing and educational programs of the past few decades. Evidence is accumulating from many quarters that all phases of human activity depend upon and even require a structural firmness if they are to be brought to some fruition.

Neill's book is really a throw-back, an atavistic return to the "good old days" when educational and psychological specialists saw the waste in human life more clearly than they saw the causes. Our perspective is not completely clear today, but some of the fog preventing clear vision is evaporating, thanks to the work of those who have a basic science orientation in the study of behavior. The fundamental principles which guide our work in the basic sciences cannot easily be challenged: Think, for example, of the germ theory of disease, and the principles of physical causality. One cannot build a biological system or a medical practice on a proposition opposite to the germ theory of disease; but one *can* build educational, treatment and general child rearing practices on principles directly opposed to those Neill asserts. The modern demands for mental health practices and principles, the increasing requirements for effective educational techniques, and the urgency with which parents and community members need help with juvenile and youthful problems—all these cry out for new solutions to old problems. I seriously doubt that Neill and his associates have fundamental observations to offer on most of these problems, or that the methods and general philosophy adumbrated in Summerhill can contribute much to the demands of a basic science of human behavior.

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Behavior problems in the children of psychotic and criminal parents—L. BENDER
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VOLUME 20—January-December, 1938

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Graphic representation of a man by four-year-old children in nine prescribed drawing situations—P. E. GRIDLEY
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Individual differences in the facial expressive behavior of pre-school children: A study by the time-sampling method—C. SWAN

VOLUME 21—January-December, 1939

1. An experimental analysis of "level of aspiration"—R. GOULD
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VOLUME 22—January-December, 1940

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The prediction of the outcome-on-furlough of dementia praecox victims—J. S. JACOB
Significant characteristics of pre-school children as located in Conrad inventory—K. H. READ
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Studies in the interpretation of play: I. Clinical observation of play disruption in young children—E. H. ERIKSON

VOLUME 23—January-June, 1941

1. An analysis of certain variables in a developmental study of language—F. M. YOUNG
An analysis of the mental factors of various age groups from nine to sixty—B. BALINSKY
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Individual differences in apperceptive reaction: A study of the response of preschool children to pictures—E. W. AMEN

VOLUME 24—July-December, 1941

1. Twins T and C from infancy to adolescence. A biogenetic study of individual differences by the method of co-twin control—A. GESELL AND H. THOMPSON
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Measurement of the size of general English vocabulary through the elementary grades and high school—M. K. SMITH
Stereotypes in the field of musical eminence—P. R. FARNSWORTH

VOLUME 25—January-June, 1942

1. A study of factors determining family size in a selected professional group—J. C. FLANAGAN
A genetic study of geometrical-optical illusions—SISTER A. WALTERS
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An investigation of the intelligibility of the speech of the deaf—C. V. HUGGINS AND F. C. NUMBERS

Genetic Psychology Monographs (continued)

VOLUME 26—July-December, 1942

1. The critical frequency limen for visual flicker in children between the ages of 6 and 18—V. L. MILLER
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VOLUME 27—January-June, 1943

1. Comparison of children's personality traits, attitudes, and intelligence with parental occupation—N. R. MADDY
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VOLUME 29—January-June, 1944

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VOLUME 32—July-December, 1945

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VOLUME 33—January-June, 1946

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VOLUME 35—January-June, 1947

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VOLUME 36—July-December, 1947

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VOLUME 37—January-June, 1948

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VOLUME 41—January-June, 1950

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VOLUME 43—January-June, 1951

1. A study of copying ability in children—E. A. TOWNSEND
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VOLUME 44—July-December, 1951

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VOLUME 45—January-June, 1952

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Genetic Psychology Monographs (continued)

VOLUME 46—July-December, 1952

1. The relationship of social status, intelligence, and sex of 10- and 11-year-old children to an awareness of poverty—
F. J. ESTYAN
An empirical study of the castration and Oedipus complexes—S. FRIEDMAN
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VOLUME 47—January-June, 1953

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Personality and physical disease: A test of the Dunbar hypothesis applied to diabetes mellitus and rheumatic fever—
D. H. CROWELL
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A study of the effects of color in Rorschach response—G. G. BRODY

VOLUME 49—January-June, 1954

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E. A. HAGGARD
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VOLUME 50—July-December, 1954

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AND A. E. JONES
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measures—N. A. FATTU, E. KAPOV AND E. V. MECH
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character—D. W. MILES
Measuring personality in developmental terms: The P.P.S.—M. H. KROUT AND J. K. TABIN

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BERNSTEIN
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education—J. A. FISHMAN
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VOLUME 53—January-June, 1956

1. As the psychiatric aide sees his work and problems—F. L. WELLS, M. GREENBLATT AND R. W. HYDE
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muscle—J. D. BROTHERS
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F. N. KERLINGER

VOLUME 54—July-December, 1956

1. A study of the personality differences between middle and lower class adolescents: The Szondi Test in culture-
personality research—L. RAINWATER
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VOLUME 55—January-June, 1957

1. Academic performance and personality adjustments of highly intelligent college students—B. M. HORRALL
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Free expression of adolescents' interests—M. AMATORA
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VOLUME 56—July-December, 1957

1. Some stable response determinants of perception, thinking, and learning: A study based on the analysis of a single test
—M. L. SIMMEL AND S. COUNTS
Potentials of age: An exploratory field study—S. L. PRESSEY
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VOLUME 57—January-June, 1958

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VOLUME 58—July-December, 1958

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Some factors related to the choice-status of ninety eighth-grade children in a school society—D. ELKINS
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Genetic Psychology Monographs (continued)

VOLUME 59—January-June, 1959

1. Freshman Rorschachs and college performance—G. R. SCHMEIDLER, M. J. NELSON, AND M. BRISTOL
Perceptual aspects of attributed movement—R. W. COAN
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VOLUME 60—July-December, 1959

1. The constancy of personality ratings over two decades—R. D. TUDDENHAM
Mother-son identification and vocational interest—L. H. STEWART
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VOLUME 61—January-June, 1960

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VOLUME 62—July-December, 1960

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VOLUME 63—January-June, 1961

1. Make a sentence test: An approach to objective scoring of sentence completions—E. F. BORCATT
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VOLUME 64—July-December, 1961

1. Coping patterns of preschool children in response to intelligence test demands—ALICE MORIARTY
Studies of individual and paired interactional problem-solving behavior of rats: I. Solitary and social controls—ALAN BARON AND RICHARD A. LITTMAN
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(Manuscripts are printed in the order of final acceptance)

- A developmental study of relative needs satisfactions of youth: equilibrium—
disequilibrium 185
BY MURRAY BENIMOFF AND JOHN E. HORROCKS
- The child's conception of his religious denomination: I. The Jewish
Child 209
BY DAVID ELKIND
- A comparison of the verbal intelligence of normal and imbecile children 227 ✓
BY J. G. LYLE
- The vocational interests of Yeshiva College freshmen 235
BY BORIS M. LEVINSON
- A study of special abilities in identical twins 245
BY LOGAN WRIGHT

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A method for simultaneous observation and analysis of children's behavior	253
BY HAROLD W. STEVENSON AND NANCY G. STEVENSON	
The effects of electroconvulsive shock on emotionality and autonomic response to subsequent stress in the rat	261
BY J. O. SINES	
Children's conceptions of right and left: IV. Piaget Replication Study	269
BY DAVID ELKIND	
Effects of asphyxia neonatorum on behavior in the rhesus monkey	277
BY SUE V. SAXON	
Differences in reactivity between asphyxial and normal rhesus monkeys	283
BY SUE V. SAXON	
Toward a closer alliance between psychoanalytic and genetic schools of psychology	289
BY LUCILLE HOLLANDER BLUM AND MAX GELLER	
Effects of age and stimulus characteristics on manipulatory responsiveness of monkeys raised in a restricted environment	301
BY WILLIAM A. MASON	
Historical changes in the freedom with which children express themselves on personality inventories	309
BY B. SUTTON-SMITH, B. G. ROSENBERG, AND ELMER F. MORGAN, JR.	
The self-image in aging	317
BY JACOB TUCKMAN, IRVING LORGE, AND FREDERIC D. ZEMAN	
Comparison of anxiety patterns in adolescent boys: 1939-1959	323
BY W. W. MEISSNER, S.J.	
BOOKS	331
BOOKS RECENTLY PUBLISHED	331

A DEVELOPMENTAL STUDY OF RELATIVE NEEDS
SATISFACTIONS OF YOUTH: EQUILIBRIUM—
DISEQUILIBRIUM*

New Jersey State Teachers College at Glasboro and Ohio State University

MURRAY BENIMOFF AND JOHN E. HORROCKS

A. INTRODUCTION

Psychological need is defined in the present study as an abstraction from a classification of the observed directional aspects of behavior. It would appear to make little difference whether hypothesized needs actually exist provided their use as intervening variables enhance the explanation and prediction of behavior. It is assumed that the organization of any individual's behavior has evolved over the period of his life upon two bases; the growth and development of inherent biological structures and the process of learning. It is further assumed that a large part of the learning has been a process of socialization. The evolved behavior has occurred and been organized to serve the organism in the attainment of its needs, all of which started out from a biological base, but most of which through learning have ramified to the point where the biological origin has become obscure. Learned needs thus continue to act as motivators of behavior throughout the life-span of the organism.

Need is viewed as having two major characteristics, directionality of behavior and tension-reduction qualities. Thus, every act of behavior is conceived of as providing a tension directed to the achievement of a goal, the successful attainment of which results in need reduction. A definitive categorization of all the needs which may be hypothesized to underlie human motivation has yet to be accomplished, but it appears obvious that any classification system will contain a considerable number of "major" and "minor" needs.

Behavior, in a molar sense, is a function of individual psychological needs and appropriate situations for their expression. Whether, in the etiology of any behavioral event, the situational demand or the individual need assumes priority is a moot question. Behavior represents reciprocity between the two and neither may be ignored in the analysis of behavioral acts. For the individual the situation must be interpreted in terms of his own needs, and these are in turn modified and conditioned by the situation.

* Received in the Editorial Office on December 17, 1959.

Individual adjustment may be hypothesized to represent a status of equilibrium-disequilibrium between the exigencies of personal needs and situational demands. Good adjustment represents the interaction of a constellation of individual needs and a series of situations appropriate to the expression of those needs. An individual's entire life represents a series of attempts to reach equilibrium by need reduction through the attainment of goals consciously or unconsciously present. An unsatisfied need represents disequilibrium. When a need is unsatisfied and closure is withheld there must be a continuing effort to achieve equilibrium through need satisfaction. An individual who, consciously or unconsciously, refrains from seeking equilibrium is displaying maladjustive behavior that may well have serious implications. Adjustment in the sense discussed here is, of course, relative since at no point in any person's life will he find simultaneous satisfaction of all his psychological needs.

B. THE PROBLEM

It is the purpose of this study to examine adolescent needs as manifested by groups of youth who fall into different categories of age, intelligence, sex, grade placement, and socio-economic status. An attempt is made to answer two questions: (1) what changes take place during adolescence in need-satisfaction versus non-need-satisfaction as the needs are manifested in various environmental situations; and (2) what are the crucial areas of equilibrium-disequilibrium among youth of various categories.

It is felt that answers to these questions (1) provide data that will enable further estimates to be made regarding normative trends in the development of an adolescent population and, (2) provide information about certain periods in development during adolescence when changes are taking place in the equilibrium-disequilibrium ratio.

C. SUBJECTS

Subjects for the study were drawn from a population of high school youth living in a mid-Ohio city of approximately 10,000.

A needs questionnaire was administered to 725 children comprising the entire in-school population of grades seven through twelve in the public and parochial high schools of the city. A random sample of 200 cases, male and female combined, and stratified according to grade in school, was drawn from the completed questionnaires. This experimental sample of 200 cases consisting of 97 boys and 103 girls comprised approximately 27 per cent of all of the cases. The largest number of cases were found in grades seven, eight, and nine, with the usual decrease in numbers from grades 10 to 12.

Intelligence test scores, expressed as intelligence quotients, and based mainly on the *California Test of Mental Maturity*, were obtained from the school records. Three categories of intelligence were used: below average (IQ 58-90), average (IQ 91-110), and above average (IQ 111-154).

Classification of socio-economic status was based upon a modification of Warner's (5) seven-step system of social class identification using the index of status characteristics. For the purposes of the study three social class groupings relatively equal in number were made as follows: upper (rating 1-3), middle (rating 4-5), and lower (rating 6-7).

Subjects were divided into six age groupings. Subjects of age 11 and 12 were combined and treated as a single age group; this was also done for subjects of ages 17, 18, and 19. These two groupings were made because of the smaller number of cases at each of the five ages involved.

D. METHOD

1. Data Collection

A description of the details of construction of the needs questionnaire used in this study has been described elsewhere by Lucas and Horrocks (2). Briefly, the following procedure was used in its development. A literature search on the topic of needs yielded 70 categories of needs, many of which overlapped. Seven judges sorted the original list of categories until they had achieved the smallest number of mutually unrelated categories. It was found that 12 new needs categories emerged which were named as follows: acceptance, achievement, affection, approval, belonging, conformity, dependence, independence, mastery-dominance, recognition, self-realization, and to be understood.

Since need-behavior may differ grossly or slightly from situation to situation, eight environmental situations were developed as background settings for the individual need categories in the construction of the test items. They were: (1) Unisexual peer groups; (2) Heterosexual peer groups; (3) Unisexual pairs; (4) Heterosexual pairs; (5) Family groups; (6) School; (7) Adults; and (8) Self. The settings are self-explanatory with the exception of the Self, which included content which might have constituted for certain subjects their self-concepts in situations which did not involve other persons. It may be noted that the environmental settings refer to some of the more important areas of adolescent adjustment problems.

In constructing the individual items of the questionnaire each of the 12 needs categories was represented in each of the eight environmental situa-

tions. It was felt that a modification of the kind of item used in the fourth section of Rogers' "A Test of Personality Adjustment" (4) would be applicable because it would permit each subject to respond in terms of his perceptions of himself and his perceived goals for himself. The group needs questionnaire was, then, composed of item statements about hypothetical boys or girls behaving in hypothetical situations. The following is an example of an item which appeared in the boy's form of the questionnaire and represented the *need* acceptance within the *environmental situation* of unisexual peer groups:

All the boys in Tim's gang think he is a swell guy to have around:

Am I like Tim?	Yes	No
Do I want to be like him?	Yes	No

The subjects were instructed to respond to each of the two questions for every item in the questionnaire by checking either "Yes" or "No."

A pilot study of the first form of the questionnaire was performed and on the basis of trial information a new form was reconstructed and revised as a ninety-item needs instrument. Two forms of the test were made, one for each sex; the only difference between them being that the stem referring to a hypothetical adolescent contained a common boy's name in the boy's form and a common girl's name in the girl's form. The face sheet of the questionnaire contained a statement intended to build rapport with the subject and explain the purposes of the study. The subject was required to fill in the following information on the face sheet: name, date of birth, age, grade, father's place of business, father's occupation, mother's place of business, and mother's occupation.

The revised needs instrument was administered to the entire student population of the public high school during a specified class period and administered to the parochial school on the following day. Teachers administered the test but members of the research team circulated in the school building to supervise the total procedure. A 60 minute time period was ample for most students to complete the questionnaire.

2. Data Analysis

Two procedures were used in coding and scoring all of the items in every questionnaire of the total random sample. The first question within each test item referred to a *goal-achievement* situation—"Am I like him (her)" whereas the second question referred to a *goal-setting* situation—"Do I want to be like him (her)." The assumption was made that a subject who

responded either "Yes"-*"Yes"* or *"No"*-*"No"* respectively to the two questions was in a state of need satisfaction with reference to that particular environmental situation or need variable. Thus a response of *"Yes-Yes"* indicated that the subject positively valued a particular need or environmental variable and felt furthermore, that he had satisfied or achieved the particular need within the specified environmental setting. In this sense, then, the subject was in *"equilibrium"* with the environmental setting and need. The same concept of equilibrium could be applied to the responses of *"No-No,"* only in the negative direction. On the other hand, a combination of *"Yes-No"* indicated that the subject had the need or responded to the environmental situation in a certain way and did not want either of these two things. Therefore, he was, in effect, in *disequilibrium* with the need and environmental situation. The same concept of disequilibrium was used for the *"No-Yes"* category. Each of the items of every questionnaire was thus given a score which indicated either equilibrium or disequilibrium within that particular item.

An initial total score for each subject was thus obtained for each of the environmental settings and needs variables by summing the scores of individual response categories. After this phase had been completed, a second scoring procedure was instituted which indicated the relative success of an adolescent in achieving his goal within a specific needs category or specific environmental situation. This was accomplished by setting up frequency tables of initial need-satisfaction and need-non-satisfaction scores of the total random sample for each of the environmental and needs variables. Each of the tables was divided into upper and lower halves. The adolescent's success was relative to the success of the total sample, that is, when he was as successful as the upper half of the sample on a needs category or environmental situation, he was conceived of as being in *"equilibrium"* in that needs category or environmental situation. When, however, the youth fell in the lower half of the sample in success in achieving a goal, he was considered in *"disequilibrium"* in the need category or environmental situation. Each item for each subject was scored, thus, for equilibrium-disequilibrium on each of the eight environmental variables and each of the 12 needs variables. The dichotomized scores for each of the needs and environmental variables, together with coded scores of the *sampling variables* of sex, grade, age, intelligence, and socio-economic states, were key punched on IBM cards and sorted for analysis.

The analysis of the data was accomplished in two major operations, called herein the two levels of analysis. The first level of analysis attempted to

determine the relationship between the single sampling variables and the dichotomized criterion of equilibrium-disequilibrium on each of the eight environmental situations and each of the twelve needs variables. At the first level of analysis the cards of the total sample were sorted and counted for the total number of equilibrium and disequilibrium scores. This sorting was performed for each of the 12 needs variables and each of the eight environmental situations for each of the categories of the five sampling variables (sex, intelligence, socio-economic status, age and grade placement). The sex variable may be used as an illustration of this operation. First, the cards were sorted for sex to yield two piles, one for boys and one for girls. Each pile was then taken separately and sorted for the total number of equilibrium and disequilibrium scores on each of the 20 experimental variables, i.e., unisexual pairs, heterosexual pairs, need achievement, need acceptance, etc.

After the sorting and counting operation was completed on each of the 20 experimental variables for each of the categories of the sampling variables, each sampling variable was taken separately and the results of the dichotomized scores analyzed for statistically significant differences. That is, using the sex category as illustration, an attempt was made to determine if boys or girls had statistically significantly more equilibrium or disequilibrium scores on each of the 20 experimental variables. This procedure was continued for all of the categories of the sampling variables on all of the need variables and environmental situations. This level of analysis yielded a separate P-value for each individual analysis, indicating the relationship between the individual sampling variables and the individual experimental variables.

The method of Chi-square analysis, as indicated by McNemar (3), was used throughout the analysis of the data because it permitted the investigators to work directly with frequencies of the raw data of equilibrium and disequilibrium scores, and would serve to indicate the level of expectancy of any differences that might appear.

In the second level of analysis the subject's cards were regrouped for two sampling variables at once. It was the intent of the second level of analysis to determine the relationship between the double-combinations of sampling variables and the dichotomized criterion of equilibrium-disequilibrium on each of the eight environmental situations and each of the 12 needs variables. The 10 categories of combinations of sampling variables and the number of sub-groupings in each combination are given in Table 1.

Certain liberties were taken in combining some of the sub-groups because there was an insufficient number of cases in the sub-groups. The Chi-square method was also used in the second level of analysis. The second level of

analysis yielded P-values for each individual analysis, indicating the relationship between the double combination of sampling variables and the dichotomized criterion of equilibrium-disequilibrium on each of the 20 experimental variables.

TABLE 1
CATEGORIES OF COMBINATIONS OF SAMPLING VARIABLES AND NUMBER OF SUB-GROUPS
IN EACH COMBINATION

Combination of sampling variables	Number of sub-groups
Sex-intelligence	6
Sex-socio-economic status	6
Sex-age	12
Sex-grade	12
Intelligence-socio-economic status	7
Intelligence-age	6
Intelligence-grade	8
Socio-economic status-age	9
Socio-economic status-grade	9
Age-grade	10

E. RESULTS

Only the more statistically significant results are presented, i.e., P-values at the 10 per cent level or less. The common practice is to treat the 5 per cent level and below as significant, but the data of the present study, especially the large categories of sampling variables, may enable lower levels to be acceptable. Tables 2, 3, 4, and 5 present the interpretation of results.

Results of the first level of analysis of the environmental situations are presented in Table 2. Table 2 depicts each of the five sampling variables, the environmental variables found to be statistically significant together with their P-values, and the results in terms of equilibrium-disequilibrium. The term relatively equal means that the direction of responses was neither in equilibrium nor disequilibrium but approximated the median point between equilibrium and disequilibrium. An examination of Table 2 will show that four environmental situations were significant at least at the 5 per cent level with two falling between the 10 and 15 per cent levels.

Results of the first level of analysis of the needs variables are presented in Table 3. Table 3 differs from Table 2 in that it presents the statistically significant needs variables in Column 2 in place of the environmental variables presented in Table 2. An examination of Table 3 shows four needs variables significant at the 5 per cent level and two between the 10 and 5 per cent levels.

TABLE 2
RESULTS OF FIRST LEVEL OF ANALYSIS: ENVIRONMENTAL SITUATION

Sampling variable	Environmental situation	Results
Sex	Uni-sex pairs, 05 ¹	More dis. ³ in boys More equ. ² in girls
Age	Hetero-sex pairs, 01	Much more equ. at ages 11-12 Increasing dis. from ages 14 to 15 Relatively equal at ages 13, 16-19
	Adults, 03	Relatively equal at ages 11-12 More dis. at age 13 Much less dis. at age 14 Relatively equal at ages 15, 16 Much more equ. at ages 17-19
Grade	Hetero-sex pairs, 10-05	Much more equ. at grade 7 Dis. at grade 8 Fairly equal from grades 9-11 More equ. at grade 12
	Adults, 10-05	Relatively equal at grade 7 More dis. at grade 8 Relatively equal from grades 9-10 More equ. at grades 11-12
Intelligence	School, almost 05	Much more dis. in below-average intelligence Relatively equal in average and above-average intelligence
Socio-economic status	None	

¹ P-value of Chi-square test of significance of differences.

² Abbreviation for equilibrium.

³ Abbreviation for disequilibrium.

Results of the second level of analysis of the environmental situations are presented in Table 4. Table 4 presents in Column 1 the 10 combined sampling variables, in Column 2 the environmental variables found to be statistically significant together with their P-values, and in Column 3 an interpretation of results in terms of equilibrium-disequilibrium. As in Table 2 the term relatively equal indicates a median position between equilibrium and disequilibrium. An examination of Table 4 shows eight environmental situations significant at least at the 5 per cent level.

The results of the second level of analysis of the needs variables are presented in Table 5. Table 5 presents the double sampling combination variables in Column 1, the statistically significant needs variables together with their P-values in Column 2, and the interpretation of results in terms of equilibrium-disequilibrium in Column 3. An examination of Table 5 shows five needs variables significant at least the 5 per cent level and four significant between the 10 and 5 per cent levels.

Readers interested in all of the P-values of the Chi-square test for the first and second levels of analysis on each environmental situation and needs category may secure them by writing either of the authors of this paper.

TABLE 3
RESULTS OF FIRST LEVEL OF ANALYSIS: NEEDS VARIABLES

Sampling variables	Needs variables	Results
Sex	Achievement, 02	More dis. in boys More equ. in girls
	Mastery-dominance almost 05	More dis. in boys More equ. in girls
Age	Dependence, 10-05	Slightly more equ. at ages 11-12 Relatively equal at ages 13-14 Much more dis. at age 15 Much more equ. at age 16 Much more dis. at age 17-19
	Acceptance, 10-05	Much more equ. at ages 11-12 Relatively more equal at age 13 More dis. at age 14 Relatively equal at age 15 More dis. at age 16 Relatively equal at ages 17-19
	Mastery-dominance, 05	Relatively equal at grade 7 More equ. at grade 8 More dis. at grade 9 Much more dis. at grade 10 Slightly more dis. at grade 11 Much more equ. at grade 12
		More equ. at grade 7 Much more dis. at grade 8 Much more equ. at grade 9 Relatively equal at grades 10-12
Grade	Dependence, 05	More equ. at grade 7 Much more dis. at grade 8 Much more equ. at grade 9 Relatively equal at grades 10-12
Intelligence	None	
Socio-economic status	None	

F. CONCLUSIONS: ENVIRONMENTAL SITUATIONS

1. *School*

The variables of below-average intelligence, lower socio-economic status, female sex, and enrollment in a lower grade were most frequently associated with disequilibrium in school. Girls of below-average intelligence were particularly susceptible to maladjustment in school. There was a developmental trend for the group of average intelligence to develop from disequilibrium at the early grades to equilibrium at the upper grades. Children of below average intelligence failed to derive need satisfactions from school in any grade, while children of above average intelligence either were in equilibrium or in an intermediate state throughout their school years.

TABLE 4
RESULTS OF SECOND LEVEL OF ANALYSIS: ENVIRONMENTAL SITUATIONS

Sampling variables	Environmental situations	Results
Sex-intelligence	School, 05	Fairly equal for boys of all three levels of intelligence With sex constant and female: Much more dis. for below-average intelligence More equ. for average intelligence Slightly less equ. for above-average intelligence
Sex-socio-economic status	None	
Sex-age	None	
Sex-grade	None	
Intelligence-socio-economic status	School, 02	With intelligence constant and below-average: More dis. for lower socio-economic status Relatively equal for middle and upper socio-economic status With intelligence constant and average: More equ. for middle socio-economic status Relatively equal for lower and upper socio-economic status With intelligence constant and above average: Much more equ. for upper socio-economic status Much more dis. for middle socio-economic status Relatively equal for lower socio-economic status
Intelligence-age	None	
Intelligence-grade	School, 05	With intelligence constant and below-average: Much more dis. at lower grades (7-9) and upper grades (10-12) With intelligence constant and average: Much more dis. at lower grades (7-8) More equ. in middle grades (9-10) Much more equ. at upper grades (11-12) With intelligence constant and above-average: Relatively equal at lower grades (7-8) and upper grades (11-12) Much more equ. at middle grades (9-10)

TABLE 4 (*continued*)

Sampling variables	Environmental situations	Results
Socio-economic-status-age	Adults, 05	With socio-economic status constant and upper: Fairly equal for all age groupings but a slight tendency for younger ages (11-13) to have more equ. With socio-economic status constant and middle: Much dis. in younger (11-13) and middle (14-15) ages Much equ. in older ages (16-19) With socio-economic status constant and lower: Tendency for dis. in younger ages (11-13) Slightly less more equ. in middle age (14-15) Fairly equal in older ages (16-19)
	Hetero-sexual peer groups, 02	With socio-economic status constant and upper: Much more equ. in younger ages (11-13) Much more dis. in middle ages (14-15) Fairly equal in older ages (16-19) With socio-economic status constant and middle: Slightly more equ. in younger ages (11-13) More dis. in middle ages (14-15) and older ages (16-19) With socio-economic status constant and lower: Much more dis. in younger ages (11-13) Relatively equal in middle ages (14-15) Much more equ. in older ages (16-19)
Socio-economic	Adults, 02	With socio-economic status constant and upper: All grades fairly equal
Status-grade		With socio-economic status constant and middle: Much more dis. in early grades (7-8) Fairly equal in middle grades (9-10) Tremendously more equ. in upper grades (11-12)

TABLE 4 (*continued*)

Sampling variables	Environmental situations	Results
Age-grades	Adults, 05	With socio-economic status constant and lower:
		More dis. in early grades (7-8)
		Slightly more dis. in middle grades (9-10)
		Fairly equal in upper grades (11-12)
		At age 13: Tremendously more dis. in those placed below grade. More equ. in those correctly placed.
		At age 14: More equ. in both those placed below grade and those correctly placed.
		At age 15: Very slight dis. in both those placed below grade and those correctly placed.
		At age 16: More dis. in those placed below grade. Very much more equ. in those correctly placed.
		At age 17-19: Relatively equal in those placed below grade. Tremendously more equ. in those correctly placed.
	Uni-sex pairs, 05	At age 13: Tremendously more dis. in those placed below grade. Some more dis. in those correctly placed.
		At age 14: Very much more equ. in those placed below grade. Some more equ. in those correctly placed.
		At age 15: Tremendously more equ. in those placed below grade. More dis. in those correctly placed.
		At age 16: Relatively equal for those placed below grade. Very much more equ. in those correctly placed.
	At age 17-19:	Slightly more equ. in both those placed below grade and those correctly placed.

TABLE 5
RESULTS OF SECOND LEVEL OF ANALYSIS: NEEDS VARIABLES

Sampling variables	Needs variables	Results
Sex-intelligence	None	
Sex-socio-economic status	Achievement, almost 05	With sex constant and male: Much more dis. in upper socio-economic status. Fairly equal in middle socio-economic status More dis. in lower socio-economic status With sex constant and female: Fairly equal in upper socio-economic status Fairly equal in middle socio-economic status Much more equ. in lower socio-economic status
	Self-realization, almost 05	With sex constant and male: Much more dis. in upper socio-economic status More equ. in middle socio-economic status Relatively equal in lower socio-economic status With sex constant and female: Slightly more equ. in upper socio-economic status Relatively equal in middle socio-economic status Slightly more equ. in lower socio-economic status
Sex-age	Achievement, 05	With sex constant and male: Fairly equal at ages 11-12 Much more dis. at age 11 Somewhat less dis. at age 14 Slight tendency toward dis. at ages 15-16 Fairly equal at ages 17-19 With sex constant and female: Tremendously more equ. at ages 11-12 Relatively equal at age 13 Much more equ. at age 14 More dis. at age 15 Much more equ. at age 16 Slightly more dis. at ages 17-19
	Dependence, 05	With sex constant and male: Relatively equal at ages 11-12 Slightly more equ. at age 13 More dis. at age 14 Slight dis. at age 15 Relatively equal at age 16 Relatively equal at ages 17-19

TABLE 4 (*continued*)

Sampling variables	Environmental situations	Results
Age-grades	Adults, 05	With socio-economic status constant and lower:
		More dis. in early grades (7-8)
		Slightly more dis. in middle grades (9-10)
		Fairly equal in upper grades (11-12)
		At age 13: Tremendously more dis. in those placed below grade. More equ. in those correctly placed.
		At age 14: More equ. in both those placed below grade and those correctly placed.
		At age 15: Very slight dis. in both those placed below grade and those correctly placed.
		At age 16: More dis. in those placed below grade. Very much more equ. in those correctly placed.
		At age 17-19: Relatively equal in those placed below grade. Tremendously more equ. in those correctly placed.
	Uni-sex pairs, 05	At age 13: Tremendously more dis. in those placed below grade. Some more dis. in those correctly placed.
		At age 14: Very much more equ. in those placed below grade. Some more equ. in those correctly placed.
		At age 15: Tremendously more equ. in those placed below grade. More dis. in those correctly placed.
		At age 16: Relatively equal for those placed below grade. Very much more equ. in those correctly placed.
		At age 17-19: Slightly more equ. in both those placed below grade and those correctly placed.

TABLE 5
RESULTS OF SECOND LEVEL OF ANALYSIS: NEEDS VARIABLES

Sampling variables	Needs variables	Results
Sex-intelligence	None	
Sex-socio-economic status	Achievement, almost 05	With sex constant and male: Much more dis. in upper socio-economic status. Fairly equal in middle socio-economic status More dis. in lower socio-economic status With sex constant and female: Fairly equal in upper socio-economic status Fairly equal in middle socio-economic status Much more equ. in lower socio-economic status
	Self-realization, almost 05	With sex constant and male: Much more dis. in upper socio-economic status More equ. in middle socio-economic status Relatively equal in lower socio-economic status With sex constant and female: Slightly more equ. in upper socio-economic status Relatively equal in middle socio-economic status Slightly more equ. in lower socio-economic status
Sex-age	Achievement, 05	With sex constant and male: Fairly equal at ages 11-12 Much more dis. at age 11 Somewhat less dis. at age 14 Slight tendency toward dis. at ages 15-16 Fairly equal at ages 17-19 With sex constant and female: Tremendously more equ. at ages 11-12 Relatively equal at age 13 Much more equ. at age 14 More dis. at age 15 Much more equ. at age 16 Slightly more dis. at ages 17-19
	Dependence, 05	With sex constant and male: Relatively equal at ages 11-12 Slightly more equ. at age 13 More dis. at age 14 Slight dis. at age 15 Relatively equal at age 16 Relatively equal at ages 17-19

TABLE 5 (*continued*)

Sampling variables	Needs variables	Results
Sex-grade	Mastery-dominance, 05	With sex constant and female: Much more equ. at ages 11-12 Much more dis. at age 13 Much more equ. at age 14 Much more dis. at age 15 Much more equ. at age 16 Much more dis. at ages 17-19
		With sex constant and male: Fairly equal at grade 7 More dis. in grade 8 More dis. in grade 9 Much more dis. in grade 10 Somewhat less dis. in grade 11 Much more equ. in grade 12
Intelligence-socio-economic status	None	With sex constant and female: Slightly more equ. in grade 7 Tremendously more equ. in grade 8 Fairly equal in grade 9 Slightly more dis. in grade 10 Relatively equal in grade 11 More equ. in grade 12
Intelligence-age	Belonging, 10-05	With intelligence constant and below-average: Somewhat more equ. at younger ages (11-14) Much more dis. at older ages (15-19)
Intelligence-grade	None	With intelligence constant and average: Fairly equal for both younger ages (11-14) and older ages (15-19)
		With intelligence constant and above average: Relatively equal for younger ages (11-14) Slightly more equ. for older ages (15-19)
Socio-economic status-age	Approval, 10-05	With socio-economic status constant and upper: Relatively equal at lower ages (11-13) More dis. at middle ages (14-15) More equ. at older ages (16-19)
		With socio-economic status constant and middle: More equ. at lower ages (11-13) More dis. at middle ages (14-15) More equ. at older ages (16-19)

TABLE 5 (*continued*)

Sampling variables	Needs variables	Results
		With socio-economic status constant and lower:
		Very much more dis. at lower ages (11-13)
		Relatively equal at middle ages (14-15)
		Some more dis. at older ages (16-19)
	Conformity, 10-05	With socio-economic status constant and upper:
		More equ. at lower ages (11-13)
		Slightly more equ. at middle ages (14-15)
		Slightly more dis. at older ages (16-19)
		With socio-economic status constant and middle:
		Relatively equal at lower ages (11-13)
		Very much more dis. at middle ages (14-15)
		More equ. in older ages (16-19)
		With socio-economic status constant and lower:
		Very much more dis. at lower ages (11-13)
		Relatively equal at middle ages (14-15)
		Much more equ. at older ages (16-19)
Socio-economic status-grade	None	
Age-grade	Dependence, 10-05	At age 13: Relatively equal in those placed below grade. Slight dis. in those correctly placed.
		At age 14: More dis. in those placed below grade Very much more equ. in those correctly placed.
		At age 15: Relatively equal for those placed below grade Tremendously more dis. in those correctly placed
		At age 16: Much more dis. in those placed below grade Much more equ. in those correctly placed

TABLE 5 (*continued*)

Sampling variables	Needs variables	Results
		At age 17-19: Much more equ. in those placed below grade Relatively equal for those correctly placed
	Approval, 10-05	At age 13: Tremendously more dis. in those placed below grade Fairly equal in those correctly placed
		At age 14: Much more dis. in those placed below grade More equ. in those correctly placed
		At age 15: Very much more equ. in those placed below grade Very slight dis. in those correctly placed
		At age 16: Relatively equal in those placed below grade More equ. in those correctly placed
		At age 17-19: More equ. in those placed below grade Some more dis. in those correctly placed.

2. *Adult Relationships*

An increase in equilibrium with increasing age and increasing grade was the most marked trend in children's relationships with adults. The upper socio-economic group obtained a sufficient amount of need-satisfaction throughout the age and grade span covered in this study. There was a strong tendency for the middle socio-economic group of students to be in disequilibrium from Ages 11-15, and in Grades 8-9. The lower socio-economic status group also experienced slight disequilibrium at the younger ages and from Grades 9-10; but this tendency was less marked for the lower as compared to the middle socio-economic status group. There was a greater tendency for students who were placed below their grade to be in more disequilibrium whereas the group who were correctly placed for age were in equilibrium throughout the age-grade span. Disequilibrium in students who were placed below-grade was strongest at Age 16. There was a trend for the average intelligence group to be in disequilibrium in the lower grades and to change to a relatively equal status or equilibrium in

the middle or upper grades. Finally, there was a developmental trend for equilibrium or equal status¹ at the extremes of the age span with disequilibrium at the middle ages (13-14).

3. *Heterosexual Peer Group*

The variables of age, grade, and socio-economic status had the strongest relationship to equilibrium-disequilibrium within the environmental situation of the heterosexual peer group. The best defined relationship appeared in the upper socio-economic status group who were in equilibrium at the younger ages, changed to disequilibrium during the middle ages, and stabilized at a fairly equal status at the older ages. An equally strong relationship was seen in the lower socio-economic status group who were in disequilibrium at the lower ages, developed to equal status at the middle ages, and changed to equilibrium at the older ages. The relationship for the middle socio-economic status group was not as strong as it was for the other two status groups; however, the middle socio-economic status group showed the developmental trend of equilibrium at both middle and older ages. As far as socio-economic status and grade is concerned the strongest relationship existed for the upper socio-economic status group who showed a sufficient amount of need-satisfaction at the extremes of the grade span with disequilibrium during the middle grades. The strongest relationship for age-grade categories existed at Ages 14 and 15 where children who were placed below grade were in equilibrium whereas those students who were correctly placed showed a greater tendency toward disequilibrium.

4. *Unisexual Pairs*

In the environmental situation of unisexual pairs there was much more disequilibrium among boys and much more equilibrium among girls. The only other significant sampling variable was the age-grade combination. Thus there was a developmental trend toward greater equilibrium with increasing age in students who were correctly placed and those who were placed below grade. The strongest single relationship in the age-grade combination was at Ages 14 and 15 when there was more equilibrium in students placed below grade and more disequilibrium in students who were correctly placed.

¹ Equal status means that the direction of response was neither in equilibrium nor disequilibrium but approximated the median point between equilibrium and disequilibrium.

5. *Heterosexual Pairs*

In the environmental situation of heterosexual pairs there was a trend for equilibrium at the middle ages of 14 and 15. This relationship was particularly strong for the upper socio-economic status group, who showed equilibrium at the younger ages, disequilibrium during the middle ages, and equilibrium at the older ages.

6. *Family Group*

The strongest relationships present in the environmental situation of the family group appeared for students of below-average intelligence, particularly girls, and for children of either upper or middle socio-economic status groups to show disequilibrium. However, students of below-average intelligence and lower socio-economic status showed equilibrium in the family group. Boys and the average and above-average intelligence groups did not reveal any significant relationships in this environmental situation.

G. CONCLUSIONS: NEEDS CATEGORIES

1. *Achievement*

In the need category of achievement there was a general trend for boys to exhibit greater disequilibrium. Girls of all three levels of socio-economic status were either in equilibrium or occupied a median position. Boys of both upper and lower socio-economic status showed disequilibrium but middle socio-economic boys exhibited neither equilibrium nor disequilibrium. In the developmental pattern for age, boys showed disequilibrium at the middle ages and relatively equal status at either extreme of the age span. Girls presented equilibrium until Age 15 when there was a change toward slight disequilibrium which continued to the end of the age span considered in the study.

2. *Self-Realization*

The trend in the needs category of self-realization was one in which girls of all three groups of socio-economic status showed either equal status or equilibrium. On the other hand, there was a very strong relationship for boys of upper socio-economic status to show more disequilibrium and for boys of both middle and lower socio-economic status to show either equal status or greater equilibrium.

3. *Dependence*

Generally speaking, there was a trend in development during the grades for equal status or equilibrium at all the grades with the exception of Grade 8

where disequilibrium was present. Boys showed a sufficient amount of need-satisfaction at either extreme of the age span but exhibited disequilibrium at the middle ages. The girls' responses were tremendously variable with age in the sense that they began with equilibrium at the youngest age, changed direction in need-satisfaction at each subsequent age, and ended with disequilibrium at Ages 17-19.

4. *Mastery-Dominance*

There was an over-all trend for disequilibrium in boys and equilibrium in girls in the needs category of mastery-dominance. There was, furthermore, a trend for either equal status or equilibrium at the extremes of the grade span with disequilibrium in Grades 9-11. Boys showed sufficient need-satisfaction at the extremes of the age span with considerable disequilibrium at Grades 8-11. Girls, on the other hand, showed sufficient need-satisfaction throughout the age span with the exception of slight disequilibrium at Age 10.

5. *To Be Understood*

In the needs category of to be understood the only significant relationships occurred with the double-sampling combination of intelligence and socio-economic status. In the below-average intelligence group there was disequilibrium in the lower socio-economic status group whereas there was sufficient need-satisfaction for both the upper and the middle socio-economic status groups. In the above-average intelligence group there was disequilibrium in the middle socio-economic status group with sufficient need-satisfactions for both the upper and lower socio-economic status groups. The average intelligence group failed to produce significant relationships in this need category.

6. *Belonging*

In the needs category of belonging the only significant relationship appeared with the double-sampling combination of intelligence and grade. The below-average intelligence group exhibited equilibrium in the lower grades (7-9) and changed to disequilibrium at the upper grades (10-12). The average and above-average intelligence groups failed to demonstrate significant relationships in the grade span.

7. *Approval*

In the need category of approval there was a developmental trend for lower socio-economic status students to be in disequilibrium at the early

and middle ages; this trend changed to equilibrium at the older ages. The upper and middle socio-economic status groups failed to produce any significant relationships in the age span. At Age 13 students who were placed below grade exhibited more disequilibrium whereas students who were correctly placed exhibited greater equilibrium. All other combinations of age and grade failed to produce significant relationships.

H. DISCUSSION

The findings of the present study represent a heterogeneous picture quite difficult to coordinate under any single concept of developmental psychology. Satisfactory interpretation appears to require various concepts, drawn from different areas, which can help to explain masses of data.

One of the more interesting findings of the present study was the general developmental trend for youth to experience varying amounts of disequilibrium during the early teens and the middle grades of high school. There was a decided trend for greater need-satisfaction to occur at either extremes of the high school age and grade span. The concepts of environmental demands, psychological needs, and skill in learning new tasks could well account for this phenomenon. When a child is pre-adolescent, from about Ages 11 to 13 and when he is in Grades 7 to 8, the demands of the situations which he meets are such that childish patterns of behavior may still be successful in achieving basic need-satisfactions. It is not unlikely that the environmental situation in which the pre-adolescent finds himself may actually foster this childish pattern during this period. Take for example the environmental situation of his relationships with adults. Here the pre-adolescent may be successful in obtaining his need-satisfactions if he continues with the same childish kind of behavior that he utilized earlier in his life. However, upon entering adolescence the youth may be faced with a slightly different situation, namely, that adults now demand certain behavior of him for which he has little background of experience. Therefore, it is during adolescence that the youth is learning those skills which will make for better adjustment, both from the point of view of environmental demand and his own need to obtain basic satisfactions. It is important to note that essentially the same relationship existed in the environmental situation of heterosexual pairs. During pre-adolescence a youth may reject intimate associations with the opposite sex and still be satisfying his own needs and environmental pressures. However, upon entrance into adolescence he experiences changes in his needs (puberty) and his peer culture may demand that he become more skillful and resourceful with members of the opposite sex. Until he reaches the

point where he can truly be skillful in his relationships with the opposite sex a child tends to be in a state of more-or-less need-non-satisfaction. When those skills which are necessary for adjustment to various situations have been learned, the adolescent is capable of meeting the demands of his own needs and those of environmental situations. This situation of need-satisfaction, thus, appears to be fairly well established after Age 16 and around the tenth grade. The writers do not mean to indicate that all adolescents used in the present study possess complete need-satisfactions after the aforementioned age and grade; there are always, of course, individual differences.

The implication of the foregoing general finding is the need for school and other community resources to concentrate more of their efforts during early adolescence to aid in furthering adjustment of youth. Social programs and curricula could be adapted to the needs of youth of this period in such a manner that they would have an opportunity to learn, quickly and efficiently, skills that will help them in meeting the demands of their present and future situations. It may well be that part of the generally better adjustment with advancing age and grade reflects a selection factor in which poorly-adjusted students leave school in the earlier grades.

Another explanatory concept is that of social reward. Social reward may be illustrated by treating the situation that children of below-average intelligence and of lower social class exhibited greater disequilibrium within school. Hollingshead (1) has made the point that a large portion of the teachers of our public schools come from the middle social class. These teachers have grown up and have learned the values, attitudes, etc., of their class. Within the school situation the teacher can be a mediator of rewards and punishments. The teacher can be intrinsically involved in whether a school child achieves success or failure experiences. It would seem, then, that as far as the present study is concerned there is a possibility that teachers were either not rewarding or not constructing situations in which success could take place for the below-average intelligence and lower social class youngster. With the failure to obtain sufficient need-satisfactions this kind of youth apparently perceives the school as a place in which he fails to achieve need-satisfaction.

In the needs categories of achievement and mastery-dominance it was found, generally, that girls had greater equilibrium whereas boys had greater disequilibrium. Thus, it would appear that girls are better able to obtain need-satisfactions, particularly in these two needs areas. The concepts of social role and opportunity to experience success may be relevant here. Apparently boys may experience a change in their social role as they progress

from preadolescence through puberty. Girls may not experience a drastic change in their social roles. Girls may also experience more success for their achievement needs especially if teachers would tend to react more favorably toward them. Thus boys are presented with the added adjustment problem of a changing social role (from the dependent childish role to the dominant male adult role) and a lack of background experience of learning how to react to a newer role. Thus, again, until boys learn social skills which will make them more effective in achieving status, they apparently experience disequilibrium of needs of achievement and mastery-dominance.

Another point that could be made here is the fact that there was, generally speaking, a lack of a linear relationship between the sampling variables and equilibrium-disequilibrium within any of the environmental situations or needs categories. That is, it was rarely found in the present study that as one progressed through varying degrees of sampling variables (such as increasing intelligence or social class) that there was a corresponding increase in equilibrium or decrease in disequilibrium in an environmental situation or needs category. It was found, rather, that a relationship would exist for one or two categories of a sampling variable and the criterion of equilibrium-disequilibrium. Apparently a qualitative change takes place in need-satisfaction and need-non-satisfaction as one progresses through a sampling variable within any specific area. The effect of this process is that one cannot predict greater or lesser equilibrium or disequilibrium within varying degrees of a sampling variable by sheer knowledge of the extent of equilibrium or disequilibrium in one category of the sampling variable.

Finally, the fact that sex, age, and grade produced the greater number of significant results may be explained on the grounds that culture demands different developmental tasks from different sex groups and different age groups. Social class, as used in the present study, did not produce as many significant results. This may be explained partly on the basis of the most strongly weighted criterion used for social class, i.e., father's occupation. A more meaningful criterion to use for identification of social class may be an estimate of the degree of need-satisfaction within the customary three levels of social class. This would enable finer differentiation within social class categories. Thus, an investigator could contrast one group that was achieving need-satisfactions within a social class with a group that was achieving need-non-satisfaction within the same social class.

It is, of course, necessary to remember that the validity of the findings cited in this study depend not only upon the acceptability of the concept equilibrium-disequilibrium but upon the method used to measure it. A

further problem of validity has to do with the needs variables selected and, of course, with the groups of items used to measure them. Selection of the needs variables, while based on a search of the literature and the opinion of judges, was at best arbitrary, and certainly the items selected to measure the needs variables represented the subjective judgment of the writers. A factor analysis of the items reported by Lucas and Horrocks (2) has indicated that a different grouping of items would have yielded a somewhat different picture of needs categories.

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THE CHILD'S CONCEPTION OF HIS RELIGIOUS DENOMINATION: I. THE JEWISH CHILD*¹

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A. INTRODUCTION

This is the first of three studies dealing with Jewish, Protestant, and Catholic children's conceptions of their religious denominations. For a starting point the studies take the genetic psychology of the Swiss psychologist, Jean Piaget. Piaget assumes that conceptions develop in discernible stages which follow a regular sequence related to age. In Piaget's view the year levels at which the stages appear may vary with individual, cultural, or training differences but the *sequence* which the stages follow is unmodifiable and necessary. A major purpose of the present study is to discover whether there are discernible stages in the development of the Jewish child's conception of his religious denomination.

The present study differs from related social psychological studies (Clark and Clark, 1952; Hartley, 1948; Horowitz, 1939) in its focus on stages of conceptual development rather than on ethnic identification or on awareness of multiple group membership.

B. METHOD

1. *Subjects*

Two hundred and ten Jewish children attending a day camp² in Westwood, Massachusetts, were tested. The sample consisted of 30 subjects at each year level from five to 11 randomly selected from a total camp population

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¹ This study was carried out while the writer was consultant to the Cambridge Child Guidance Center. The writer is grateful to the director of the clinic, Dr. Robert Reid, for granting time to collect the data. To the members of the Clinic Staff and especially to Dr. Charles Hersch, Chief Psychologist, the writer is indebted for friendly support and encouragement.

² The writer is greatly indebted to Louis Lowy, Camp Coordinator; Leonard I. Nemeth, Summer Day Camp Director, and Frances Goren, Camp nurse whose cooperation made the study a pleasurable experience. To the head counselors, Beatrice Tosi, Helen Dennison, Richard Goldman, Judith Meyers, Leonard Freedman, Gertrude Cohen, Jack Winitizer, Ben Adler and the many assistant counselors the writer owes a hearty thanks. The study was made possible through the courtesy of the Jewish Centers Association of Greater Boston.

of over 800 children. The mean age and standard deviation for each year level is given in Table 1.

TABLE 1
MEAN AGE AND STANDARD DEVIATION FOR SEVEN YEAR LEVELS USED IN STUDY
N = 30 AT EACH YEAR LEVEL

Year level	Mean age	SD (mo.)
5	5-7	1.33
6	6-4	2.77
7	7-6	2.65
8	8-5	2.66
9	9-4	2.96
10	10-6	2.87
11	11-4	3.44

The children came from families differing: in religious affiliation (reformed, conservative, or orthodox); in socio-economic status (from lower to upper middle class); and in their emphasis on religious training (from none to having children attend parochial day school). No attempt to control these factors was made. Any uniformities which appeared despite so much uncontrolled variation would have greater significance for a developmental theory than would uniformities appearing in an experientially homogeneous sample. Piaget's view is that experience can stimulate and guide but not dominate the development of conceptions.

2. Procedure

Each child was seen individually and asked the following questions: (a) Is your family Jewish? Are you Jewish? Are all boys and girls Jewish? Why? (or why not?); (b) Can a dog or a cat be Jewish? Why? (or why not?); (c) How do you become a Jew? (For young children. What makes you Jewish?); (d) What is a Jew? (e) How can you tell a person is Jewish? (f) Can you be Jewish and American at the same time?

The questions were always asked in the above order which produced replies with the least perseveration and repetition. Whenever answers were ambiguous, *E* asked general questions like "Tell me more about it?" or "How do you mean?" Sometimes *E* asked pointed questions to test the limits of the child's comprehension or conviction. When children answered "I don't know," *E* encouraged them to guess.

Although children were asked not to discuss the questions among themselves, many youngsters learned of the questions before they were tested. This probably did not contaminate the findings for several reasons: (a) there were no right or wrong answers to be transmitted; (b) children often got

distorted versions and never heard all the questions; (c) most children were resistive to the suggestions of their peers and eager to answer for themselves; (d) children who did parrot answers were, like all children, poor liars and it was easy for *E* to help the child disregard answers he did not really believe; (e) the variety among children's formulations and inner consistency of a particular child's replies could hardly be accounted for by group suggestion. For all these reasons children's responses were regarded as revealing their own conceptions.

3. *Qualitative Analysis*

Piaget (1929) describes three criteria that must be observed to infer the presence of developmental stages: (a) uniformity in ideas at a given year level often extending over several year levels; (b) appearance of ideas from an earlier year level as part of, or added to, the more advanced ideas given at a higher year level; (c) an increasing correctness (conformance with adult conceptions) of children's ideas with increasing age. All these criteria were met by responses given in the present study. Accordingly these responses were classified by stages.

C. RESULTS

1. *The Nature of Jewishness*

Answers to questions (a, b, d, f,) were similar and fell into groups which suggested three stages in the development of the child's conception of Jewishness.

a. *What is a Jew?* Children's definitions formed the center of the cluster of ideas which marked each stage.

(1). At the first stage children had only a global, undifferentiated impression of a Jew as a kind of person. If these children spontaneously, or at *E*'s prompting, tried to tell how a Jew differed from a Catholic or a Protestant, they said that Jews had different hair or skin color or came from a different land, etc.

Sid (6-3) What is a Jew? . . . "A person." How is a Jewish person different from a Catholic? . . . "'Cause some people have black hair and some people have blonde."

Mel (5-9) How is a Jewish person different than a Catholic? . . . "He comes from a different country." Which one? . . . "Israel."

Errors children made in defining a Jew reflected their failure to correctly categorize religious, racial and national characteristics.

(2). Children at the second stage had a concrete conception of a Jew

as a person who behaved in certain ways. A Jew was a person who went to the Synagogue, celebrated Jewish holidays and wore Jewish stars, etc.

Mar (7-9) What is a Jew? . . . "A person who goes to temple and Hebrew School."

Definitions at this stage showed a correct categorization of Jewish characteristics. The definitions were, however, concrete in the sense that they failed to include the non-observable element which the different actions of Catholic, Protestant and Jew had in common. Instead the definitions implied that religious categories, and not merely the members of those categories, were absolutely different from one another. Put differently, children at this stage were in a position to correctly classify a person as Protestant, Catholic, or Jew although they were not yet able to classify the religious groups within a single category.

(3). Third stage children had an abstract conception of a Jew as a person who believed in one God and worshipped in a different way.

Sid (10-4) What is a Jew? . . . "A person who believes in one God and doesn't believe in the New Testament."

Lea (11-10) What is a Jew? . . . "A person of a different faith. He believes in one God."

At this stage children correctly included Jewish within the general category of "beliefs." Religious groups were no longer differentiated concretely and absolutely by the behavior of their members but were distinguished abstractly and relatively by differences in the content of their beliefs. In short, at the third stage differentiation between denominations was not by means of the *religious subject* but rather by means of the *religious object*. Table 2 gives the per cent of children at each stage.

TABLE 2
PER CENT OF CHILDREN ANSWERING QUESTION, "WHAT IS A JEW?"
FOR THREE STAGES AND SEVEN YEAR LEVELS
N = 30 AT EACH YEAR LEVEL

Year level	Global ^a	Stage Concrete ^b	Abstract ^c
5 ^d	50	7	—
6	70	30	—
7	23	67	10
8	27	60	13
9	3	54	43
10	—	23	77
11	—	27	73

^a "A person with blonde hair, etc."

^b "A person who goes to Synagogue, lights the candles on Friday night, etc."

^c "A person who believes in one God, etc."

^d Forty-three per cent of the five-year-olds gave no classifiable reply.

b. Can a dog or a cat be Jewish? This question (asked before the previous one) produced answers which served as a check and to amplify the stages described above.

(1). Children at the first stage had a general impression of Jewishness as a human characteristic, but had no clear idea what it was. They were satisfied to say that a dog or a cat could not be Jewish because it was a dog or cat, a pet, or went bow-wow.

Bo (5-9) Can a dog or a cat be a Jew? . . . "No." Why not? . . . "Because it's a dog." But why can't it be Jewish? . . . "Because it goes bow-wow."

Replies at this stage suggested that Jewishness was conceived as an absolute quality. When forced to say why a dog could not be a Jew, the child answered as if he were asked why a dog could not be a human being. For these children a dog or a cat could not be a Jew for the same reason that it could not be a horse or a cow.

(2). The second stage child conceived Jewishness concretely both as a group of characteristic actions and as a family quality. These two ideas about the nature of Jewishness led to contradictory answers. When the child thought of Jewishness as ways of behaving he said dogs and cats could not be Jewish because they could not go to the Synagogue, light the candles, etc. But when the child thought of Jewishness as a family quality, he said a dog or cat could be Jewish if it belonged to a Jewish family. Although a child usually gave one or the other answer, its opposite was easily elicited by prompting. Some children spontaneously gave both answers. But at this stage they were not able to resolve the contradiction.

Sta (8-3) Can a dog or a cat be a Jew? . . . "No." Why not? . . . "They are not human." What difference does that make? . . . "They can't go to the Synagogue or say the prayers . . . but I guess if it belonged to a Jewish family it could be Jewish." Could a lion or a tiger be Jewish? . . . "No, because they are wild. Nobody owns them."

Children's reasons for saying that dogs and cats could not be Jewish were correct but concrete. They implied that dogs and cats could not be Jews only because of bodily limitations (with paws animals could not light candles). For these children being Jewish depended upon the ability to carry out certain actions.

Several hidden aspects of children's thinking were reflected in their reasons for saying that dogs and cats could be Jewish. They were in a sense correct

in assuming that Jewishness was a family quality. Their error arose from: (a) an undeveloped conception (Piaget, 1928) of a family as all those persons living together, which made a pet dog or cat a member of the family; (b) a primitive idea of participation which gave rise to the idea that belonging to the family caused the pet to possess (to participate in) all the qualities of the family.

(3). At the third stage children conceived Jewishness abstractly as a mental quality. Replies at this stage indicated that animals could not be Jewish because they were "dumb," "had no brains" and "could not understand things like that."

Sid (11-4) Can a dog or a cat be Jewish? . . . "No." Why not?
 . . . "Because they are not human and wouldn't understand a religion."
 Tom (11-6) Can a dog or a cat be Jewish? . . . "No." Why?
 . . . "Cause its mother and father don't have a religion and don't have a human brain."

These answers which associate Jewishness with the brain and mind complemented definitions (given usually at the same time) of a Jew as a person who believed in one God. This provided the necessary check on the children's use of the term "belief." The answers showed clearly that these children understood that belief was a mental quality and that they were not simply parroting an adult verbalization. Table 3 presents the per cent of children

TABLE 3
 PER CENT OF CHILDREN ANSWERING QUESTION, "CAN A DOG OR A CAT BE JEWISH?"
 FOR THREE STAGES AND SEVEN YEAR LEVELS
 N = 30 AT EACH YEAR LEVEL

Year level	Global ^a	Stage Concrete ^b	Abstract ^c
5 ^d	60	13	—
6	60	40	—
7	16	77	7
8	10	77	13
9	—	93	7
10	3	77	20
11	—	57	43

a "Because it's a dog, it goes bow-wow."

b "Because it's not human, can't go to Synagogue, light candles, stuff like that."

c "Because it hasn't any mind, wouldn't understand a religion."

d Twenty-four per cent of the five-year-olds gave no classifiable reply.

at each stage for seven age groups giving answers to the question Can a dog or cat be Jewish?

c. Are all boys and girls Jewish? The answers to this question reflected the categorical changes which accompanied the content changes in the child's developing conception of Jewishness.

(1). Children at the first stage had a global impression of Jewish as a kind of category and their first impulse was to say that not all boys and girls were Jewish because some were Catholic.³ When, however, they spontaneously, or at *E*'s prompting, attempted to say what else children could be besides Jewish and Catholic, then they added racial and national denominations.

El (6-2) Are you Jewish? . . . "Yes." And is your family Jewish? . . . "Yes." Are all boys and girls Jewish? . . . "No." Why? . . . "Because some are colored, they speak another language."

Lin (5-10) Are you Jewish? . . . "Yes." And is your family Jewish? . . . "Yes, uh all except my dog, he's a French poodle."

These children, who usually could not correctly categorize national, racial and religious characteristics, were also unable to categorize national, racial and religious denominations.

(2). Children at the second stage conceived Jewish as a distinct category clearly differentiated from other religious and non-religious categories. They said that not all boys and girls were Jewish because some were Catholic and/or Protestant. If they attempted spontaneously, or at *E*'s prompting, to say what else children might be, then they named only religious denominations.

Pi (7-3) Are all boys and girls Jewish? . . . "No." Why? . . . "Because some are Catholic and some are Protestant." Can you tell me any more like that? . . . "There is sump'in like Buddhists, but I don't know what the others are."

Though answers at this stage were empirically correct, they were logically incomplete. A logically complete answer would have accounted for *all* possible children who were not Jews. Children at this stage, however, limited themselves only to one or two non-Jewish denominations with which they were familiar. The incompleteness of their answers lay in their failure to verbalize an inclusive category which contained all possible denominations and so all non-Jewish children.

(3). The conception of Jewish at the third stage was of a sub-category included within the general category of religions. Answers at this stage stated that not all boys and girls were Jewish because "There were other religions."

³ Most of the children came from the Boston area which is the largest diocese in the country so that the children's school mates and playmates were likely to have been Catholic.

Dav (10-6) Are all boys and girls Jewish? . . . "No." Why is that?
 . . . "God made all different religions."

These answers appeared at the same time, or slightly after the child began saying that Jewishness was a mental quality and a Jew one who believed in one God. Once the child discovered that people of all denominations had in common the belief in a God, he was able to form the general category of religions. The percentage of children at each stage for seven age groups answering the question Are all boys and girls Jewish? is given in Table 4.

TABLE 4
 PER CENT OF CHILDREN ANSWERING QUESTION, "WHY ALL BOYS AND GIRLS
 ARE NOT JEWISH?" FOR THREE STAGES AND SEVEN YEAR LEVELS
 N = 30 AT EACH YEAR LEVEL

Year level	Global ^a	Stage Concrete ^b	Abstract ^c
5 ^d	67	7	—
6	60	40	—
7	23	67	10
8	17	63	20
9	3	74	23
10	7	17	76
11	—	33	67

^a "'Cause some are Catholic, colored, Irish."

^b "'Cause some are Catholic and Protestant."

^c "'Cause there are different religions."

^d Twenty-four per cent of the five-year-old children gave no classifiable response.

d. Can you be an American and a Jew at the same time? Answers to this question provided a check on the child's logical ability. It came last because it was the most direct.

(1). Children at the first stage conceived being a Jew as an absolute designation which excluded any other designation. Amusingly these children denied they were American if they admitted they were Jewish or vice-versa.

E. (6-2) Can you be Jewish and American at the same time?
 . . . "No." Why? . . . Are you an American? . . . "No." Are you
 a Jew? . . . "Yes."

These answers paralleled similar replies obtained by Piaget (1928) when he asked children whether they were Swiss and Genevan. Several kinds of interpretation are possible. Psychologically the child took Jew and American as proper names and assumed that like all proper names, there was only one to a person. Accordingly, if a person was "Jew," he could not be "American" no more than John could be Jim.

Logically the child's difficulty was due to his inability to perform logical

multiplication.⁴ Logical multiplication is the ability to attribute two qualities to one class of objects at the same time; for example, to form the class of brown wooden beads. In another study Elkind (1961c) has shown that children at this age cannot at the same time attribute to kindergarten pupils the properties of being both children and boys or girls. In the same way children of the present study thought that being both Jewish and American was an impossibility.

(2). Children at the second stage conceived of Jewish as a quality compatible with the quality of being American. Typically they answered that "You are born a Jew and live in America."

Pi (7-8) Can you be an American and a Jew at the same time?
 . . . "Yes." How is that possible? . . . "Because you can live in America and be an American Jew."

These children were clearly able to perform logical multiplication and to conceive that a person could be both Jewish and American. Explanations for why a person could be both Jewish and American, however, were empirical: since a person could actually both live in America and be Jewish, he could be both things at once. At this stage being Jewish and American was a fact calling for an explanation by means of other facts.

(3). Third stage children conceived Jewish and American as sub-categories included within two different general categories. They justified their statements that Jews could be Americans by saying in effect that Jewish was a religion and American a nationality, and that they were different things.

Dav (10-6) Can you be an American and a Jew at the same time?
 . . . "Yes." How is that possible? . . . "Because Jewish is a religion and American is a nationality. They are two different things."

Third stage children took being Jewish and American as a logical conclusion which could be deduced from a knowledge of the general categories involved. Table 5 gives the percentage of children at each stage for seven age groups answering the question Can you be a Jew and American at the same time?

2. *The Origin of Jewishness*

In Piaget's classic work (1930) he found 17 different forms of causality in the child. Piaget dealt, however, primarily with physical causality and

⁴ The explanation could equally well be made from the point of view of logical addition. Both types of operation are involved and a complete explanation will be given in another paper which will take account of findings with Catholic and Protestant children.

Day (10-6) Are all boys and girls Jewish? . . . "No." Why is that?
 . . . "God made all different religions."

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11	—	33	67

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Logically the child's difficulty was due to his inability to perform logical

multiplication.⁴ Logical multiplication is the ability to attribute two qualities to one class of objects at the same time; for example, to form the class of brown wooden beads. In another study Elkind (1961c) has shown that children at this age cannot at the same time attribute to kindergarten pupils the properties of being both children and boys or girls. In the same way children of the present study thought that being both Jewish and American was an impossibility.

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not with ethnic phenomena. Some answers obtained in the present study fit into some of the categories mentioned by Piaget but other answers fell into categories not mentioned by him. The categories fell into groups corresponding to three stages.

TABLE 5
PER CENT OF CHILDREN ANSWERING QUESTION, "CAN YOU BE JEWISH AND AMERICAN
AT THE SAME TIME?" FOR THREE STAGES AND SEVEN YEAR LEVELS
N = 30 AT EACH YEAR LEVEL

Year level	Global ^a	Stage Concrete ^b	Abstract ^c
5 ^d	63	17	—
6	74	26	—
7	23	77	—
8	10	87	3
9	—	90	10
10	—	67	33
11	—	60	40

a "No, can't have two, only if you move."

b "Yes, I'm a Jew and I live in America."

c "Yes, they're different things—Jewish is a religion, American is a nationality."

d Twenty per cent of the five-year-old children gave no classifiable response.

a. Artificialism and moral causality. Piaget describes artificialism as "thinking . . . the things around him take notice of man and are made for man . . . everything is organized for the good of men" (op. cit. p. 245). One group of answers was clearly of this type.

Tom (6-1) How do you become Jewish? . . . "God makes you Jewish."

San (7-2) How do you become Jewish? . . . "Your mother turns you Jewish."

God at this stage was not a theological conception but a name for a powerful person as San's reply suggests. The use of "makes and turns" justifies classifying these replies as artificialism.

"By means of moral causality the child explains the existence of a given movement or of a given feature by its necessity, but the necessity is purely moral: The clouds 'must' advance in order to make night when men go to sleep" (op. cit. p. 261). Some children felt the same way about becoming Jewish.

Pa (6-5) How do you become a Jew? . . . "Your father is Jewish so you must be Jewish."

To check these interpretations the children were asked if they could change their denomination and become something else. Children at this stage said

they could not change because "you have to stay what you are," and besides "you wouldn't want to change." At this stage Jewishness had its origin in desire, intension and moral obligation.

b. Causality by generation and participation. Children at the second stage conceived the origin of Jewishness to lie either in being born of Jewish parents or in the family relationship itself.

Mi (8-1) How do you become Jewish? . . . "You are born Jewish."

Ha (9-4) How do you become Jewish? . . . "Your parents are Jewish so you are Jewish."

Once children gave up the idea of artificialism and moral causality, they attempted to explain the origin of Jewishness by saying one Jew was born out of another. This was the same sequence Piaget found (op. cit.). Children, of course, had no clear notion of birth, and for them it had only the spatial or temporal meaning of coming from something else.

Piaget did not find participations beyond the age of 5-6. But they seemed clearly present in older children of the present study. Answers like the Ha's were quite frequent. They implied (as did the affirmative answers about dogs and cats being Jewish) that because a creature was like others in some respects he was like them in all respects. It may be that participation remains until later ages when the phenomena to be explained are more personal and subjective.

c. Initiation, practice and ritual. These forms of causality were not mentioned by Piaget, but they began to appear in the oldest children of the present study.

Si (10-11) How do you become a Jew? . . . "You are bar mitzvahed. Until you are bar mitzvahed you are not a real Jew."

Pan (11-6) How do you become a Jew? . . . "You go to schul (Synagogue), obey the law sometimes (sic!) and do what a Jew is supposed to do." Once you are a Jew can you change? . . . "Yes, you go to the rabbi. He does something."

As children began to conceive of Jewishness as a mental quality or belief, they gave up participations and generations, and saw Jewishness as an acquired characteristic. The percentage of children at each stage for the seven age groups answering the question "How do you become a Jew?" is shown in Table 6.

3. *The Recognition of Jews*

Children's conceptions of Jewishness changes greatly between the ages of five and 11. The overt signs, however, by which children recognized Jews

not with ethnic phenomena. Some answers obtained in the present study fit into some of the categories mentioned by Piaget but other answers fell into categories not mentioned by him. The categories fell into groups corresponding to three stages.

TABLE 5
PER CENT OF CHILDREN ANSWERING QUESTION, "CAN YOU BE JEWISH AND AMERICAN AT THE SAME TIME?" FOR THREE STAGES AND SEVEN YEAR LEVELS
N = 30 AT EACH YEAR LEVEL

Year level	Global ^a	Stage Concrete ^b	Abstract ^c
5 ^d	63	17	—
6	74	26	—
7	23	77	—
8	10	87	3
9	—	90	10
10	—	67	33
11	—	60	40

^a "No, can't have two, only if you move."

^b "Yes, I'm a Jew and I live in America."

^c "Yes, they're different things—Jewish is a religion, American is a nationality."

^d Twenty per cent of the five-year-old children gave no classifiable response.

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Children's conceptions of Jewishness changes greatly between the ages of five and 11. The overt signs, however, by which children recognized Jews

did not undergo a corresponding development. Though there was a primitive stage at which undifferentiated identifying signs like blondness were used but after this stage children employed the same signs with almost equal frequency at all ages.

TABLE 6
PER CENT OF CHILDREN ANSWERING QUESTION, "HOW DO YOU BECOME A JEW?"
FOR THREE STAGES AND SEVEN YEAR LEVELS
N = 30 AT EACH YEAR LEVEL

Year level	Global ^a	Stage Concrete ^b	Abstract ^c
5 ^d	60	13	—
6	70	30	—
7	33	67	—
8	20	74	6
9	—	83	17
10	—	74	26
11	—	60	40

^a Artificialism, "God made me."

^a Moral Necessity, "You have to be Jewish."

^b Participation, "Your mother and father are Jewish so you are Jewish."

^b Generation, "You are born Jewish."

^c Ritual, "Have to be bar mitzvahed."

^c Indoctrination, "Have to go to Hebrew School, learn the Torah."

^c Practice, "Have to obey the law, sometimes."

^d Twenty-seven per cent of the five-year-old children gave no replies to this question.

There were four types of signs by which children said they could tell that a person was a Jew: (a) undifferentiated signs (US), "They have light skin"; (b) identifying signs (IS), "They wear Messusahs, Yarmelkas, Jewish Stars, etc."; (c) characteristic actions (CA), "They light the candles on Friday night, celebrate Hannukah, go to the Synagogue," etc.; (d) direct communication (DC), "You can't tell unless you ask them." The percentage of answers given in each category for the seven age groups is presented in Table 7. A comparison of Table 7 with the other tables illustrates how the connotation of a concept may change radically without a corresponding change in its denotation.

4. Homogeneity of the Stages

Some children answered all questions at one stage only; some answered one question at one stage and four questions at another; some answered two questions at one stage and three at another while by far the smallest number of children answered at least one question at each stage. Table 8 gives the percentage of children giving each pattern of response at each year level.

TABLE 7
PER CENT OF CHILDREN ANSWERING QUESTION, "HOW CAN YOU TELL A PERSON
IS A JEW?" FOR FOUR RECOGNITION CATEGORIES AND SEVEN YEAR LEVELS
N = 30 AT EACH YEAR LEVEL

Year level	US ^a	Recognition category IS ^b	CA ^c	DC ^d
5	10	3	7	3
6	40	7	7	7
7	10	37	30	17
8	17	43	17	20
9	7	57	37	—
10	3	60	27	10
11	10	33	30	27

Note.—Seventy-seven per cent of the five-year-old; 40 per cent of the six-year-old; 20 per cent of the seven-year-old; and three per cent of the eight-year-old children did not give classifiable responses to this question.

^a US—Undifferentiated Sign, "He has dark skin, etc."

^b IS—Identifying Sign, "He wears the Star of David, Yarmelka (skull cap) etc."

^c CA—Characteristic Action such as "He goes to the Synagogue, talks Jewish, etc."

^d DC—Direct Communication, "You can't tell only if you ask him, etc."

TABLE 8
PER CENT OF CHILDREN IN EACH RESPONSE CATEGORY FOR SEVEN YEAR LEVELS
N = 30 AT EACH YEAR LEVEL

Year level	A	Response category B	C	D
5 ^a	43	27	—	—
6	30	37	33	—
7	30	33	34	3
8	37	33	27	3
9	34	40	23	3
10	—	27	63	10
11	20	40	40	—

Note.—A = All answers were at the same stage.

B = Four answers were at one stage and the fifth answer was at an adjacent stage.

C = Three answers were at one stage and two answers were at an adjacent stage.

D = Answers were given at all three stages.

^a Classification for five-year-olds was based on four or more responses. Thirty per cent of these children did not give at least four answers.

The greatest individual variability occurred at age 10. Qualitatively these were children who seemed in the transitional phase between the second and third stages. This group was aware of the inadequacy of their former ideas without being able to replace them with more satisfying notions. Frustration and regression were more likely to have occurred in this group. Regression may, however, also be a necessary part of any conceptual progression. Table 8 shows clearly that the stages should not be regarded as absolutes and

that they contain subtle gradations which it was not possible to detail in the present paper.

Not all of the variability in Table 8 was attributable to individual differences. Some of it was due to the unequal difficulty of the questions asked. Table 9 gives the frequency of responses at a given stage for the five questions.

TABLE 9
FREQUENCY OF OBSERVED REPLIES FOR THREE STAGES AND FIVE QUESTIONS STAGE

N	Question	Global	Concrete	Abstract	
202	1 ^a	53	90	59	
202	2 ^b	45	130	27	
202	3 ^c	55	120	27	
197	4 ^d	52	80	65	
203	5 ^e	50	127	26	
	X ²	1.4	17.5**	38.6**	57.5**

^a Are all boys and girls Jewish?

^b Can a dog or a cat be Jewish?

^c How do you become Jewish?

^d What is a Jew?

^e Can you be an American and a Jew at the same time?

** Significant beyond the .01 level.

Table 9 shows that questions b, c, e, were significantly more difficult than the other two questions. This finding is consistent with those of other genetic studies (Piaget, 1941, 1942; Elkind, 1961a) which have shown that the nature of the materials and questions asked can affect the level of the child's performance quite independently of his level of intellectual development.

The more difficult questions may have been so because they were unfamiliar to the children. Whereas the children might easily have heard or asked "What is a Jew?" or "Why aren't all boys and girls Jewish?", it was unlikely they had ever before been confronted with questions like "Can a dog or a cat be Jewish?" Answers to the more familiar questions were more likely to be influenced by direct instruction and adult verbalizations. Since these influences were likely to increase with age, they may explain why the questions were of equal difficulty at the first stage and of unequal difficulty thereafter.

D. DISCUSSION

A complete discussion of the present results will be given in a separate paper which will take account of the responses of Protestant and Catholic children. This section will deal only with issues raised by the related social psychological studies: (a) Ethnic Identification; (b) Ethnic Conceptual Development; (c) Compatibility of Multiple Group Membership.

1. *Ethnic Identification*

Several investigators (Clark and Clark, 1952; Hartley, 1948; Horowitz, 1939) have found that ethnic identification occurs in the nursery and elementary school years. In the present study the same held true; all of the 210 children readily said that they were Jewish, that their families were Jewish, but that all boys and girls were not Jewish.

2. *Ethnic Conceptualization*

Using questions similar to those employed in the present study Hartley (1948) found evidence of development in the conception of "American." Prior to age 6:6 American was used mainly as a symbol (name); between 6:6 and 8:6 the symbol interpretation was abandoned and the child thought of an American as distinguished by an activity; between the age of 8:6 and 10:5 activity definitions continued to appear together with definitions of American as a personal quality "it takes courage, be brave, be smart." These results found with a different sub-cultural and geographical group clearly paralleled the stages described in the present study.

Hartley did not find, however, a developmental sequence in the children's definitions of Jewish! Both Jewish and non-Jewish children defined Jewish primarily in terms of activity. Nonetheless Hartley did find a small proportion of the older children saying that Jewish was a belief, religion, etc. Hartley's failure to find the stages reported in the present study may have been due to his small sample. He used only forty-six Jewish children between the age of 3:5 and 10:6, and only thirty-one of these replied to the question about Jewishness. Also, the conception of American may develop earlier (Weinstein, 1957) than the conception of Jewish so that Hartley may have seen mainly the second stage of the "Jewish" conceptual development.

3. *Multiple Group Membership*

Hartley's (1948) findings regarding the awareness of multiple group membership were consistent with those of the present study for the younger, but not for the older, age levels. Hartley found that religious and national-ity memberships were thought of as incompatible at all the upper age levels in his sample. In contrast the present results suggest that awareness of multiple group membership becomes more differentiated and correct with increasing age. The difference between Hartley's results and those reported here may lie in differences in type of questioning, and in the ethnic composition and size of the samples.

4. *The Meaning of Ethnic Identification*

What the present study adds to these social-psychological findings is the meaning of ethnic identification and multiple group membership at different ages. The adult uses the terms "Jew" and "Jewish" in at least three different senses: (a) as a proper name to designate a particular person, *The Wandering Jew* or *The Jew of Venice*; (b) as a class name to designate a particular group of people, *The German Jew*; (c) as a conceptual term to mean a religious belief, "*Protestant, Catholic, Jew all have etc.*" While the Jewish adult may identify himself as a Jew in any one, or all, of these senses, the present study suggests that: (a) at the first stage children can identify with "Jew" only in the sense of a proper name; (b) second stage children can identify with "Jew" both as a proper name and as a class to which they belong; (c) children at the third stage can identify themselves as Jews in all three senses of the term as it is employed by the adult. The young child's use of the phrase *I am a Jew* should not be mistaken for an identification with a group or a belief. At the first stage the child uses the verb "to be" only in the attributive sense and not yet in the sense of class inclusion. The meaning of his ethnic identification depends, therefore, upon the child's level of conceptual development.

E. SUMMARY

Two hundred and ten Jewish children between five and 11 were questioned about the nature and origin of Jewishness. The results were in agreement with Piaget's hypothesis that conceptions develop in a regular, age related sequence of stages. At the first stage (usually 5-6) children had a general undifferentiated impression of Jews as a kind of people differing from Catholics and Protestants in such things as hair color and country of origin. Second stage children (usually 7-9) had a concrete conception of Jews as a class of people distinguished from other religious groups by their ritual observances and family relationships. Children at the third stage (usually 10-11) had an abstract conception of Jews as a sub-class of people who believed in God and who differed from Catholics and Protestants only in the content of their belief.

In their conception of the origin of Jewishness, first stage children attributed being Jewish to artificialism and moral causality; second stage children attributed being Jewish to generation and participation; while third stage children attributed being Jewish to initiation, ritual, and indoctrination. There was little change with age in the four kinds of overt signs children

used to identify Jews. The results were briefly compared with those of social psychological studies and some but not complete agreement was found on issues of (a) ethnic identification, (b) ethnic conceptualization, and (c) awareness of multiple group membership. Full discussion of the results was left for another paper where findings from Catholic and Protestant children will also be considered. It was concluded that the meaning of ethnic identification and multiple group membership was dependent upon the child's level of conceptual development.

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A COMPARISON OF THE VERBAL INTELLIGENCE OF NORMAL AND IMBECILE CHILDREN*¹

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A. INTRODUCTION

The problem to be discussed here is whether imbecile children suffer a particular linguistic retardation, or whether this retardation can be accounted for merely in terms of their general intellectual level.

A survey of the literature reveals no clear-cut answer to these problems. No doubt this is in part due to the absence of any suitable scales for measuring speech development. Luria (1947) suggests that low grade defectives are particularly retarded in linguistic development because of damage to the higher nervous centres. For example, it has been shown that although imbeciles may learn simple tests by conditioning (Luria and Vinogradova, 1959) and even solve simple problems by applying learned principles (Hermelin and O'Connor, 1958) speech does not play its full part in the learning process. These experiments suggest that non-verbal intelligence may be less impaired than verbal intelligence in imbeciles.

Goldstein's (1948) observations seem to suggest that the impairment of abstract attitude applies particularly to language. He points out that as a function of loss of structure, these patients suffer impairment of certain inner processes connected with language, and are deprived of the benefit of past experiences, which they cannot verbalize. They are therefore largely dependent upon external cues for the solving of problems. This again suggests that the non-verbal abilities of imbeciles may be in advance of their verbal abilities.

Direct studies in this subject are remarkably few and far between. Thompson and Magaret (1947) compared the performance of mentally retarded children with that of normal children on the 1937 Binet test. The authors attempted to show, by rating the items, that the pattern of

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relative successes and failures for imbeciles could not be adequately explained by the degree to which past experience contributes to the passing of these items. Similarly, they showed that Kounin's (1948) concept of *rigidity* did not adequately account for the pattern of successes or failures.

Sarason (1949), reporting the findings of Thompson and Magaret, pertinently observes that of the 12 items upon which defectives surpassed normals, eight require response to a visual stimulus and six of these eight do not require any oral response. On the other hand, of the 20 items upon which normals surpass defectives, all but two require an oral response. Eight of these 20 items involved memory.

Somewhat strangely, it seems to the writer, Sarason suggests that this pattern of failures and successes is likely to be due to the anxiety aroused in these children by a school-like situation, which must be associated with an unpleasant memory of past failures.

That higher-grade defectives who have been wrongly placed at school do become very sensitive to their intellectual inadequacies, can be vouched for by the writer, who has tested many of them in an ordinary child guidance situation. But an experienced or sympathetic clinician can largely overcome this tendency. It seems more relevant to point to the concordance of these findings with the observations of such investigators as Goldstein and Luria, and to conclude that, on the whole, mental defectives probably find non-verbal items easier than verbal items.

Karlin and Strazzulla (1952) state that mentally defective children usually present an uneven distribution of their intellectual and performance abilities, usually showing marked inadequacy in processes that require abstraction and symbolisation. From the context of this statement, it seems that the authors refer to the discrepancy between intellectual and locomotor development—a phenomenon that comes to notice when scoring the various developmental areas for Gesell-type developmental quotients.

The same authors quote a table of "developmental milestones" for idiots, imbeciles and feeble-minded children, showing the age in months at which certain developmental processes first occurred. The data were gained retrospectively from parents—always a precarious method, but probably the only practical one in the circumstances. All of these children lived with their parents, and attended a clinic; and only reliable parents were selected for interview. (No doubt this selectivity has resulted in some bias towards conscientious, middle-class families).

On the basis of this table, it would seem that the imbeciles begin to

say words 20 months after they can walk, and that they begin to walk and babble at about the same time. This clearly represents an uneven locomotor and linguistic development as compared with normal children, but it does not follow that in later life imbeciles will perform better upon non-verbal than upon verbal items in an intelligence test.

TABLE 1
AGE IN MONTHS AT ONSET OF ACTIVITIES IN RELATION TO IQ

	IQ 15-25	IQ 26-50	IQ 51-70
Sitting	14.7	11.2	10.6
Walking	31.0	23.5	14.4
Babbling	25.0	20.4	20.8
Words	54.0	43.2	34.5
Sentences	153.0	93.0	89.4

Sievers (1959) compared two groups (brain injured and non-brain injured), aged from 5-11 years, with normal subjects of the same mental ages, using the Differential Language Facility Scale. She found the normals superior to both groups of imbeciles at the higher mental ages on total language score, gesture sequence matching, speed sound mimicry, and non-sense grammatical mimicry. This study also suggests that the superiority of normals over imbeciles of the same mental age level may increase with increasing mental age.

It should be noted, however, that Sievers' imbeciles were resident in an institution; so that it cannot be said that their retardation in linguistic ability is typical of imbeciles who live in the community. The discrepancy between normal and imbecile subjects may only be a measure of the retarding effects of the institution.

A further point which demands attention is that in the original standardisation of the test used by Sievers, the subtests did not intercorrelate highly, suggesting that they were tapping different functions. It is interesting to note that on no subtests involving spontaneous verbalisation were the normals clearly superior to both groups of imbeciles (though they were generally superior to the brain-injured group).

Sievers remarks that normals were superior to imbeciles on subtests requiring expression without semantic meaning—surely the opposite of what might have been expected! It is also interesting to note that imbeciles (who are often described as "imitative") did less well on subtests involving imitation than the normal children.

B. PROCEDURE

In the present investigation, the Imbecile Sample consisted of imbecile children, CA $6\frac{1}{2}$ years to $13\frac{1}{2}$ years; IQ (non-verbal) 20-50, who lived at home with their parents and attended day schools in Middlesex. They may therefore be regarded as living in optimal circumstances.

The normal Sample consisted of normal children between the ages of $2\frac{1}{2}$ years and five years who were attending nursery schools of day nurseries in London.

TABLE 2
DISTRIBUTION OF NON-VERBAL MA IN NORMAL AND IMBECILE SAMPLES

Mental age level (Non-Verbal) Years and Months		Normals frequency	Imbecile frequency
2-6 to 2-11		12	11
3-0 to 3-5		12	14
3-6 to 3-11		17	17
4-0 to 4-5		12	11
4-6 to 4-11		5	5
5-0 to 5-5		2	2
5-6 to 5-11		2	2
Total		62	62
Normals	Q.1	37.25 months	
	Median	44.0 months	
	Q.3	50.25 months	
Imbeciles	Q.1	37.43 months	
	Median	43.6 months	
	Q.3	49.95 months	

The intellectual status of the two groups in terms of non-verbal IQ is as follows:

	Normals (N = 62)	Imbeciles (N = 62)
Mean Non-Verbal IQ	109.06	36.76
SD	17.80	5.82
Mean verbal IQ	113.47	33.37
SD	21.10	7.89

The procedure adopted was to pair imbecile and normal children individually for non-verbal mental age on the Minnesota Preschool Scale. From a pool of 117 imbeciles and 80 normals, 62 pairings could be made on this basis. The pairing was done first by exactly matching as many pairs as possible. From the remainder, pairings were made within one month of mental age, and finally, within two months of mental age. Where more than one pairing was possible, the matching was done by randomly choosing names

from a hat. On only four occasions were the pairs separated by as much as two months of non-verbal MA, so that the matching of pairs was affected almost exactly.

Mental Age and IQ. The distributions of non-verbal mental age reflect the closeness of the matching by the similarity of medians and quartiles:

The socioeconomic class of the normal and imbecile samples should be quoted, since this variable is known to be related to verbal achievement. The classification of fathers' occupations is that used in the Registrar-General's Classification of Occupations Census, 1951.

TABLE 3
SOCIOECONOMIC CLASS OF THE NORMAL AND IMBECILE SAMPLES

	Class I	Class II	Class III	Class IV	Class V	Un- classified
Normals	3.2%	6.5%	41.9%	12.9%	30.6%	4.8%
Imbeciles	1.6%	8.1%	64.5%	6.5%	12.9%	6.5%

A further breakdown of Class II (Skilled occupations) reveals that the number of "white collar" occupations (i.e., clerical-sales) was five for the imbecile sample and six for the normal sample. Any differences in verbal intelligence between the two groups in favour of the normal children could not be explained in terms of differing socioeconomic home backgrounds; for the imbeciles tend to come more frequently from middle-class homes.

A clinical classification of the imbeciles can only be given in terms of mongolism-non-mongolism, since no other reliable classification was available in the official records in Middlesex:

Mongols	N = 35
Non-Mongols	N = 27
Total	N = 62

No child who was considered by the teachers as deaf, and no severely spastic child was included in the sample of imbeciles.

C. RESULTS

In the matching process, both mongols and non-mongols were paired with normal children for non-verbal MA. Since previous studies (Lyle, 1959, 1960) had revealed some differences between mongols and non-mongols on a number of verbal tests, it was thought advisable to test these two types of imbeciles separately.

The analysis of variance took the form of a cross-classification with

proportionate frequencies in the subgroups. The results for mongols and non-mongols (and normals paired with each of these types of imbeciles) were at first analysed separately.

TABLE 4
DISTRIBUTION OF NON-VERBAL MENTAL AGE FOR NORMALS AND PAIRED IMBECILES (N = 62)

Non-Verbal MA	Normals and paired mongols	Normals and paired non-mongols
2-6 to 2-11	8	4
3-0 to 3-5	9	3
3-6 to 3-11	7	10
4-0 to 4-5	7	5
4-6 to 4-11	2	3
5-0 to 5-5	1	1
5-6 to 5-11	1	1
Total	35	27

However, the results were the same in each case. *The between types* mean square for normals and paired mongols was significant beyond the .001 level ($F = 11.0$; df 1 and 60); and for normals and paired non-mongols, ($F = 5.66$, df 1 and 44), significant at the .05 level. The mean difference between normals and paired imbeciles was approximately five months of verbal MA in the case of both mongols and non-mongols.

A combination of all 62 pairs of imbeciles (i.e., mongols and non-mongols combined) was undertaken, since the mongol/non-mongol dichotomy had little or no effect upon the analysis.

TABLE 5
ANALYSIS OF VARIANCE—NORMALS AND IMBECILES (N = 62)

Source	df	Mean square	F
Between MA levels	4	2,452.79	46.45 $P < .001$
Between normals and imbeciles	1	805.29	15.25 $P < .001$
Interaction	4	31.08	n.s.
Residual	114	52.80	

It will be seen that the difference between normals and imbeciles in verbal intelligence is significant at the .001 level. An estimate of the differences in mean verbal MA is provided by the following table of means and standard errors, where

$$SE = \sqrt{\frac{\text{Residual Mean Square}}{n \text{ for each age}}}$$

TABLE 6
MEANS AND SE'S FOR NORMALS AND IMBECILES

	2-6 2-11	3-0 3-5	3-6 3-11	4-0 4-5	4-6 & over	Total
N	12	12	17	12	9	62
Mean Verbal MA (in months) (Normals)	35.6	38.8	47.2	50.3	60.4	45.8
SE of mean	2.10	2.10	1.76	2.10	2.42	0.92
Mean verbal MA (in months) (Imbeciles)	26.6	33.4	43.4	46.5	56.8	40.7
Difference between means	9.0	5.4	3.8	3.8	3.6	5.1

Thus, for the 62 matched pairs of normals and imbeciles, there is a highly significant difference in verbal intelligence, amounting to a mean difference of about five months of verbal MA, in favour of the normal children.

Although the tendency seems to be for greater differences to occur at the youngest MA level (2-6 to 2-11), the interaction effect with mental age is not significant.

The correlation of Non-Verbal and Verbal MA on the Minnesota Preschool Scale was .83 for the normal children, and .86 for the imbeciles. The normal children were, on average, 1.7 months of MA higher on the verbal than on the non-verbal subtest, whereas the imbeciles averaged 3.2 months of MA lower on the verbal than on the non-verbal subtest.

D. SUMMARY

For the 62 pairs of normal and imbecile children, matched for non-verbal MA, there were highly significant differences in verbal intelligence, in favour of the normal children, as measured by the verbal subtest of the Minnesota Preschool Scale.

This was equally true whether the paired imbeciles were mongols or non-mongols.

The mean difference amounted to about five months of verbal MA.

There was no significant interaction effect with mental age. However, in this respect, it is interesting to note that a significant interaction effect with MA has been found in comparing certain aspects of the speech and language of normal and imbecile children (Lyle, 1961). In that study, it was shown that imbeciles do develop more slowly in verbal ability than normals of the same non-verbal MA.

E. DISCUSSION

From this present study, it seems that imbecile children, even when living in optimal environmental circumstances (i.e., living with parents and

attending day schools), are retarded in verbal intelligence when compared with normal children of the same non-verbal MA.

This finding suggests that imbecile children may suffer a constitutional retardation of verbal intelligence; that is, due to impairment of the higher cortical centres, the symbolic processes involved in verbal learning and reasoning lag behind other aspects of cognitive development.

It must also be remembered, however, that long residence in an institution may result in the further retardation of verbal intelligence as a function of environmental factors (Lyle, 1960). In this sense, imbeciles in institutions may be said to suffer a dual handicap in their development of verbal intelligence.

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THE VOCATIONAL INTERESTS OF YESHIVA COLLEGE FRESHMEN*

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A. INTRODUCTION

While studies of intelligence (Levinson, 1958b) values (Perlman, 1959), and problems (Levinson, 1958a) of Yeshiva College freshmen were made, no extensive analysis of their vocational interests, as far as this writer is aware, is available. The majority (Levinson, 1958a) of Yeshiva College freshmen are products of traditional Yeshiva (day) schools. The environment of these schools is quite different from that of the American high school and their curriculum does not follow the standard American pattern. There is a double curriculum; one, secular, following the pattern of state approved programs, and the other, religious. The main aim of the religious curriculum is the implantation of the central idea that life has a purpose and everything a person does must be purposive in the service of God. These religious goals can be best carried out through—(a) performing kind and charitable deeds, (b) training for family life, and (c) study of the principles of Torah (religious laws and obligations). The fundamental assumption on which these schools plan their curriculum is that holiness can be pursued through study. As a result, there is an emphasis on abstract and verbal ability and a neglect of manual and outdoor activities as well as art and music.

A child must make out well in his studies to show that he is following the teaching of his elders and also in order to be well thought of socially. Anti-intellectualism, with its ridicule of "brains" and "grades" has not affected this group. Quite the contrary, members of this subculture are proud of being "egg-heads." This brings about the development of a world dominated by scholastic achievement with an emphasis on deferred gratification and the need for a high level of aspiration. This tends to develop a somewhat compulsive student who will work at any scholarly subject, whether liked or disliked, in order to secure a high grade. Further, the more intellectual the activity, the more favorably he will respond to it. Activities which are culturally neglected will appear less important, and to indicate an interest

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in them may thus be ego deflating. Such activities, therefore, will tend to be less liked than others which are culturally approved.

The choices made by a Yeshiva College freshman on an interest test will reflect his awareness that certain choices are appropriate for him and certain others are not; they will be a reflection of his concept of self and of his future role and values; and of his ego ideal, i.e., the kind of people with whom he has identified himself. However, we do not wish to imply that these test items will have the same meaning to each subject. When these boys come to college, they are already thoroughly imbued with the Yeshiva spirit and a study of their interests may, therefore, indicate some of the effects these cultural values have on their personalities. They, further, may show the road or roads they wish to take toward professional advancement, and the occupation they may wish to enter. It may further shed some light on the mainspring of the upper-mobile strivings of this particular traditional group, and possibly the Jewish people as a whole.

B. PURPOSE

It is the aim of this research to determine what are the interests of Yeshiva College freshmen. We have adopted a definition of interest as "an individual's generalized behavior tendency to be attracted to a certain class of activities" (Guilford, 1959).

C. KUDER PREFERENCE RECORD

The Kuder Preference Record Vocational (KPRV) was selected as the measuring tool. It must be realized that the KPRV is an empirical instrument devised to meet the needs for vocational guidance and that no attention was paid to the possibility that it might be used in subcultural comparisons. KPRV, just like any other test, is culture bound and, therefore, would tend to stress activities important in American middle-class society. The items chosen to measure interests were selected with this frame of reference in mind. It, thus, appears obvious that if the interests of Jewish religious youth were chosen as a point of reference, the items selected and the interest areas emphasized would be somewhat different.

KPRV consists of 168 item sets describing various activities. Each set consists of three activities out of which the subject has to select the one he likes least and the one he likes best. Out of these choices, ten interest scales are derived. These scales are as follows: Outdoor (O), Mechanical (1), Computational (2), Scientific (3), Persuasive (4), Artistic (5), Literary (6), Musical (7), Social Service (8), Clerical (9). There is also a verification scale to make sure that the subject follows the instructions correctly.

In considering the choices presented to the subject on the Kuder, one must consider the fact that the subject is faced with a "forced choice" test and his relative likes and dislikes determine choices made. He has to make a choice and indicate a preference even though the items he has to choose from may all be acceptable or not acceptable, or the degree of dislike of one item in one area may be much higher than the degree of dislike of an item in another area. In other words, while likes and dislikes are measured, the intensity of these is not indicated. It is further to be remembered that, since the student gives us his relative choices on the various scales, high scores in one area will mean that he, by necessity, will have low scores in another area. The resulting profile would, therefore, indicate the relative degree of interest rather than the absolute degree of interest.

It is to be noted that norms for students attending denominational colleges are not available (Thomas, personal communication).

The norms for the boys' profile are based upon the scores of 3418 high school boys selected from representative schools in the country (Kuder, 1956, p. 21). The norms for the adult profile are based upon a representative group of 1000 men. "These people are probably more similar in background to adults usually counselled" (Kuder, 1956, p. 23).

D. RELIABILITY

Reliability of the various KPRV scales vary from .85 to .92 (Kuder, 1956, p. 21). *Validity* is shown in terms of the conformance of the various occupational groups with their interest profiles (Kuder, 1956, p. 14).

E. PROCEDURE

The KPRV was administered during the freshman orientation periods in the years 1955-1958. The standard administration procedure was followed. The scores of the freshmen who did not participate in the testing during the freshman orientation period, as well as those whose verification score indicated that the test results were questionable, were excluded from this study.

F. RESULTS

Table 1 presents the medians, means, standard deviations of the means, and 50th percentile scores (based on boys' norms) obtained by Yeshiva College freshmen on the Kuder Preference Record. We may note that these boys' interests are concentrated in the computational, scientific, literary, and social service areas, and that there is a disinterest in outdoor, mechanical, and artistic pursuits. Further, there is quite a scatter in their interests both in culturally fostered and culturally disapproved or neglected areas.

TABLE 1
 MEDIAN, MEANS, STANDARD DEVIATIONS OF MEANS, AND 50TH PERCENTILES OF SCORES
 OBTAINED BY YESHIVA COLLEGE FRESHMEN (N = 418)

	Scales									
	0	1	2	3	4	5	6	7	8	9
	Out- door	Mechan- ical	Com- putat.	Scient.	Per- suasive	Artistic	Literary	Musical	Soc. serv.	Clerical
Mean	34.53	34.86	27.05	47.3	41.35	19.65	23.89	13.01	48.01	43.71
SD of means	14.24	11.62	10.39	13.56	14.04	9.80	7.94	6.80	14.53	14.35
Median	33	35	26	48	39	17	24	11	48	42
50th percentile*	18	22	61	70	48	15	80	40	85	40

* Based upon high school boys (N = 3418).

Since these students come from the same subcultural level, and participation in various activities is equally open to all of them, differences in interests here would, it appears to the writer, be more of a reflection of personality needs than it would be in a more heterogeneous population.

Table 2 presents the significant differences between the means converted into percentile scores, of Yeshiva College and University of Pittsburgh freshmen. The conversion into percentiles facilitates comparison. The norms

TABLE 2
SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEAN PERCENTILE SCORES¹ OF THE
YESHIVA COLLEGE FRESHMEN AND UNIVERSITY OF PITTSBURGH FRESHMEN^a

Scale	Yeshiva College N = 418 Mean	University of Pittsburgh N = 1426 Mean	Diff.	SED%	t
1. Mechanical	25	38	13	2.65	—4.90*
2. Computational	45	53	8	2.69	—2.98*
3. Scientific	72	65	7	2.64	2.66*
4. Persuasive	54	57	3	2.76	1.09
5. Artistic	40	50	10	2.69	—3.72*
6. Literary	69	60	9	2.70	3.33*
7. Musical	59	67	8	2.70	—3.02*
8. Social service	67	45	22	2.78	7.91*
9. Clerical	48	47	1	2.78	0.36

* Significant at the .01 level.

— In favor of University of Pittsburgh freshmen.

¹ Based upon adult norms (N = 1000).

used are those for adults. We may note that similarly to the comparison previously made (Table 1), here, too, the Yeshiva boys show a distinct scale profile, i.e., a pronounced elevation in scientific, literary, and social service areas, and a depression in mechanical, computational, artistic and musical scales. We may, therefore, conclude that the Yeshiva College freshmen have a unique configuration of traits and they are comparable to a representative sample of college freshmen only in the persuasive and clerical scales. However, it is most important to keep in mind the SD for each scale which indicates that the mean profile does not represent the profile of any particular student.

Table 3 presents the percentile chart for the Kuder Preference Record to enable counselors working with Yeshiva College students to evaluate their interests, not in the light of general norms, but in the light of norms for their own peers.

^a The University of Pittsburgh freshmen took Form B, an earlier edition of the test. This accounts for the lack of the Outdoor Scale (Magill, 1955). Their mean scores have been transmuted into percentile scores for Form B and considered comparable to Form C percentiles. "All data from Form B on scales one through nine are consistent and satisfactory for use with Form C" (Kuder, 1956, p. 19).

TABLE 3
PERCENTILE CHART
KUDER PREFERENCE RECORD
YESHIVA COLLEGE FRESHMEN
(1955-1958)
N = 418

Per- centile	Out- door	Mechan- ical	Computa- tional	Scien- tific	Persua- sive	Artis- tic	Liter- ary	Musical	Social service	Cler- ical
99	72-	62-	51-	69-	72-	43-	39-	28-	74-	81-
98	64-71	60-61	47-50	66-68	69-71	41-42		26-27	73	75-80
97	61-63	58-59	46		67-68	40	37-38		72	72-74
96	60	56-57	44-45	65	65-66	38-39	36		71	69-71
95	58-59	55	43			36-37		25	70	68
94		53-54		64	64	35	35			66-67
93	57	52	41-42		63	34		24	69	65
92	55-56	51	40	63	62				68	63-64
91	54				61	33		23	67	62
90				62	60	32	34	22		61
89	52-53	50			59				66	59-60
88	51	49	39	61	58	31			65	
87						30		21		
86	50	48	38		57		33		63-64	58
85			37	60		29				
84	49	47			56		32	20	62	57
83	47-48		36							56
82		46		59		28			61	
81					55		31			55
80		45	35	58		27		19	60	
79	45				54	26	30			54
78			34						59	
77	44	44			53	25		18		53
76	43	43		57	52			17		
75			33						58	
74		42			51		29			
73	42					24			57	52
72		41		56						
71	41	40	32		50		28	16		51
70					49				56	

TABLE 3 (continued)

Per- centile	Out- door	Mechan- ical	Computa- tional	Scien- tific	Persua- sive	Artis- tic	Liter- ary	Musical	Social service	Cler- ical
69				55		23				
68	40		31		48			15		50
67					47	22			55	
66	39	39		54					54	49
65			30		46		27			
64				53		21				48
63	38				45					
62			29		44			14	53	
61	37			52			26		52	47
60		38				20				
59	36			51	43		25		51	46
58		37	28					13		45
57	35			50	42	19				
56					41				50	44
55	34		27					12		
54		36		49		18	24		49	
53					40					43
52	33		26	48	39				48	42
51		35								
50	32								47	
49		34		47			23	11		41
48	31				38	17				
47			25		37				46	
46		33		46						40
45										
44										
43										
42	30				36	16	22		45	39
41		31-32	24	45	35				44	38
40		30		44			21	10		
39									43	
38	29			43	34	15				
37	28	29								
36			23				20			
35				42					37	
									36	

BORIS M. LEVINSON

TABLE 3 (continued)

Per- centile	Out- door	Mechan- ical	Computa- tional	Scien- tific	Persua- sive	Artis- tic	Liter- ary	Musical	Social service	Cler- ical
34	27		22						42	
33		28			33	14				35
32				41			19	9		
31	26			40					41	
30		27	21		32				40	34
29				39		13			39	
28	25	26					18	8		33
27			20	38	31					
26		25								
25				37					38	
24	24				30		17			32
23		24	19	36		12			37	
22	23		18		29		16	7	36	31
21	22			35					35	
20		23		34						
19						11			34	30
18	21		17	33	28		15	6	33	
17		22		32		10			32	
16				31	27		14			
15	20	21	16		26				31	
14	19			30			13	5	30	29
13		20	15	29	25	9				
12	18	19		28					29	28
11	17				24	8	12			27
10			14						28	
9	16	18		27	23		11		27	26
8		17	13	26	22	7	10	4	26	24-25
7	15			25						
6	14	16	11-12		21				24-25	23
5									22-23	21-22
4	13	15	10	23-24	20	6	9	3		
3	12	14	9	22	17-19	5				
2	10-11	12-13		17-21	15-16	4	8	1	20-21	19-20
1	1-9	1-11	1-8	1-16	1-14	1-3	5-7		18-19	18
							1-4		1-17	1-17

G. DISCUSSION

Our findings confirm a previous study in which it was stated that "the cultural atmosphere of the home, the parental background, and hence parental example and training, play an important part in influencing young people in their vocational preferences and selections" (Moser, 1952, p. 526).

It seems to us that the distinctive interest pattern of Yeshiva College freshmen is due to their subcultural experiences. This, of course, raises the problem as to how these subcultural values became internalized and became part of the ego ideal of the Yeshiva student. A detailed analysis of this problem will take us too far afield and we shall reserve its discussion for another paper.

Our finding of specific Kuder Preference Record Vocational patterns for Yeshiva College freshmen raises the distinct possibility that we may be able to find Kuder patterns which would be specific for other subcultural or socio-economic groups. This would mean that, in interpreting a KPRV profile, one must review it very broadly in the light of not only the individual's previous family and school experience, but also in light of his cultural matrix.

H. IMPLICATIONS FOR GUIDANCE

A student who is following the same curriculum as everyone else, yet whose vocational interests are so different, is obviously misplaced. Presumably this student is a product of the same subcultural forces as his peers and yet he is so different. The resultant differences may usually be ascribed to personality differences. Such a student may possibly be a personality problem.

I. SUMMARY

It is well known that traditional Jewish religious doctrines emphasize study as a religious obligation and stress abstract verbal learning. It was, therefore, hypothesized that Jewish religious youth, graduates of schools emphasizing these values, would show interest patterns peculiar to such a subculture.

Kuder Preference Records, Vocational, administered to 418 Yeshiva College freshmen were analyzed. These were significantly lower than a representative college population in mechanical, computational, artistic, and musical scales, and significantly higher in scientific, literary, and social service scales.

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A STUDY OF SPECIAL ABILITIES IN IDENTICAL TWINS*

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A. INTRODUCTION

The term "special abilities" is used by Thorpe (37) and others to distinguish between intelligence and other abilities such as musical, artistic, and mechanical abilities. To say that these abilities are divorced from intelligence is true to the extent that there are factors other than general intelligence involved when a person excels in these areas. It is not to say that intelligence is not a factor in helping a person become an opera star, painter, or highly skilled craftsman, but only that certain abilities other than intelligence are essential.

The fact that different individuals possess varying degrees of these special abilities is obvious. The purpose of this study is to discover something of what causes these differences. The starting point for answering this question seems to be in determining the roles played by heredity and environment in the acquisition of such abilities.

A twin study affords a convenient method for determining which differences are hereditary and which are environmental. If identical twins reared in different environments are studied, one could hypothesize that all differences are environmental. However, this is not to say that all likenesses are necessarily hereditary.

The design of this study includes testing the special abilities of a set of identical twin boys raised, since early infancy, in relatively different environments. As a check, a set of identical twin girls reared in relatively identical environments were tested. Thus, it could be assumed that differences found in the boys were environmental, and that similarities would tend to be hereditary.

However, if radical differences were found in the girls, whose environments have been very similar, then this would leave some question as to the validity and reliability of the tests.

Both sets of twins are given a battery of tests to determine their musical, artistic, athletic, and mechanical abilities. The results of these tests, though not conclusive of course, point in the direction of some interesting assumption.

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B. DESIGN

The design of this study consists of giving a battery of tests for special ability to two sets of identical twins. Each set of twins was chosen for a special reason. The first twins are 10-year-old boys. They have been reared, since infancy, in different homes, in which the environments are very different. The second twins are 19-year-old girls. Being students at the school (Bethel College) where the study was conducted made them available. Also, they were chosen because their environment has been even more similar than that of most twins.

Administering these tests involved a total of 14 different monitors and assistants other than the person in charge. This included two timers, two observers, two recorders (shorthand), four monitors, and four people called "hosts" and "hostesses." Their job was to entertain the subject while the other sibling was being tested. These assistants were junior college students who volunteered for their jobs. Their lack of training in psychology is not considered to be a factor, since the duties which they performed required no specific training.

The test for athletic ability consisted of tests created specifically for this study. Athletic ability was broken down into five basic attributes: coordination, strength, agility, endurance, and reaction time. Four endurance tests were given: one running (time for 600 yards), one exercise and two for ability to do without oxygen (activity while holding breath). Ten trials on a reaction time apparatus were given. The reaction time test measured the period of time required to move from an "accelerator" to a "brake." The coordination test consisted of six different tests of the subjects to execute various coordinated movements (exercises). Strength was tested by determining the amount of weight one could lift with both legs, both arms, and one arm.

The subjects were given five agility tests to measure both their speed and accuracy in moving over and under a stationary bar. For artistic ability, each twin was administered a Meier Art Judgment test. The Mechanical comprehension test by George K. Bennett was given in order to judge mechanical ability. The subjects took the Seashore Measures of Musical Talents test for musical ability. This test divides musical ability into six basic components: pitch, volume (loudness), rhythm, time (duration), timbre (quality). Ability is based on one's discrimination between sounds which possess varying degrees of these six attributes.

These tests were administered to one set of twins at a time. Usually the

boys would be tested one day and the girls the next. Only in the athletic ability tests were the subjects separated while the testing was going on. However, in the music, art, and mechanical tests, the subjects were seated so as not to be distracted by one another. The testing consisted of two phases for each set of twins. During the first phase they took the athletic ability tests, and in the second they received the artistic, mechanical, and musical tests.

Two of the major problems in the study were: incentive on the various tests, and cooperation of the subjects. Incentive was a greater problem on the various athletic tests. Since the girls were students, their cooperation was secured by letting them take the tests in lieu of some course work. The incentive was provided by assigning them grades for the course work on the basis of how well they did on tests. Since they are both very ambitious students, this provided considerable incentive. The boys posed a more difficult problem in both cooperation and incentive. In order to obtain permission to test them, the assistance of one of their relatives was secured. He in turn contacted the respective guardians in behalf of the study. With his contact as an "ice breaker," a visit was made to the two homes. Cooperation was secured after explaining in detail the nature of the study, arranging for transportation, and promising to give each guardian a set of pictures to be taken during the tests.

For incentive the boys were rewarded with varying amounts of bubble gum and comic books depending on how well they did on the test. As unusual as this may seem, it did provide considerable motivation.

Since coefficient of correlation is not practical when using only two sets of twins, a ratio of similarity $\frac{(\text{low score})}{(\text{high score})} \times 100$ was figured between the scores made by twins on the various tests. If the ratio of similarity between the girls was very high and the ratio between the boys was low, then the attribute was considered to be influenced by environment. Also, if there was a large span between the two ratios, then environment was considered to be a factor. On the other hand, if the span between the two ratios was small, or if the boys had an unusually high ratio, then heredity was considered to be the primary factor.

In athletic ability, "F" (the rural twin) raised in a different environment did somewhat better than "L" his urban brother. This was particularly true on the endurance and strength tests. Their responses on reaction time, agility, and coordination were more alike. The ratio was .71 for endurance and .72 for strength. Coordination was .87, agility .93, and reaction time 1.00. The girls were more alike in each of the five areas. The strength tests were for

arm strength (one arm), strength with both arms, and leg strength. Each of the four twins, regardless of how much he lifted, could lift twice as much with two arms as with one arm, and twice as much with his legs as with his arms. The fact that this was true in all four cases should contribute to the reliability of the test.

In artistic ability the ratio was very high for each set, and the boys were more alike than the girls. However, in mechanical ability, the ratios were both relatively low. The span was greater here than on any other test (.46). "F" (rural twin) was very high.

In musical ability the boys were more alike than the girls on three tests: rhythm, pitch, and loudness. The ratio was high for both groups on tonal memory and rhythm. Low scores with wide spans were found for loudness, time and timbre.

C. CONCLUSIONS

It is amazing how much identical twins tend to be alike in some abilities only to be so different in others. Even when their backgrounds are radically different (as in the case of "F" and "L"), they were still more alike than was originally hypothesized in some areas.

Special abilities are hopeless entanglements of maturation and learning. Though environment tended to be more of a factor in some abilities than in others, there was not a single ability that was found to be completely free of either heredity or environment. Also, the precise effects of each are impossible to isolate or define.

In athletic ability, the attributes of coordination, agility, and particularly

TABLE 1

Special ability	Ratio of similarity		Influence of environment
	Girls	Boys	
Athletic ability	.94	.85	
Reaction time	.94	1.00	
Agility	.97	.93	slight if any
Coordination	.93	.87	slight if any
Strength	1.00	.72	small
Endurance	.87	.71	some
Artistic ability	.93	.97	marked
Mechanical ability	.66	.20	slight if any
Musical ability	.82	.78	marked
Tonal memory	.99	.97	
Rhythm	.92	1.00	slight if any
Pitch	.80	.84	slight if any
Loudness	.73	.79	small
Time	.87	.59	small
Timbre	.60	.49	some

reaction time seem to be almost exclusively inherited. This assumption is based on the fact that each twin tended to be like his sibling. Even the boys were nearly as much alike as the girls. This seems to be a sound assumption since these attributes are probably based on sensory acuity. Sensory acuity is probably inherited.

Strength seems to be influenced by environment. The girls recorded exactly the same scores for all strength tests. However, there were considerable differences in the boys. On the endurance tests, there were considerable differences in the boys' scores. Also, there were some differences in the girls' scores. This might indicate that endurance is greatly influenced by environment, and that even the slight variations in the girls' background caused a difference here.

The fact that strength and endurance are greatly influenced by environment seems logical. Strength and endurance are probably based on cellular (muscle cells) activity. Thus, they would lend themselves to conditioning much easier than would sensory acuity. The conclusion is that reaction time, agility, and to a certain extent coordination are based on neurological activity. This would make them less moldable than attributes (strength and endurance) based on cellular (muscular) activity.

Artistic ability (art judgment) seemed to be primarily inherited. This could be because it too is based on visual acuity and discrimination.

In contrast, mechanical ability appeared to be greatly influenced by environment. "F", the rural twin, did *far* better (5 times) than did "L." This is unusual since Dr. George K. Bennett who devised the test indicated that taking a course in physics improves the mean score of a group only 4 per cent. If one identical twin scores five times as high as the other, then environment must be a factor. But if this is so, why doesn't training in physics help? A possible answer seems to be that it is during the early years when environment has its effect. By the time an individual is old enough to take physics courses, his ability may be pretty well determined. The presence of farm machinery and other farm devices during "F's" early years could be responsible for some of the difference.

Of the musical ability group, tonal memory, and rhythm appeared to be influenced least by environment. Time and timbre seemed to be influenced the most, with pitch and volume in between. There seems to be no explanation for this, since all are based on auditory acuity (particularly difference threshold). Failure to get accurate test results is probably the answer.

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A METHOD FOR SIMULTANEOUS OBSERVATION AND ANALYSIS OF CHILDREN'S BEHAVIOR*

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A. INTRODUCTION

Naturalistic observation of children's behavior is a potentially important but relatively unexploited source of information about children. Many difficulties associated with the method have in the past prevented its productive application. It is expensive and time-consuming; observational records are difficult to quantify; and information is inevitably wasted. Basic to these difficulties is the fact that an adequate conceptual unit for the analysis of observational records has been lacking in most studies, a notable exception being the work of Barker and Wright (1). The temporal and physical units typically used in the past have in general made possible little more than a frequency tabulation, sometimes of rather diverse types of behavior under single categories; and they have not in general taken cognizance of the differential meaning of these types of behavior for individual children.

A unit of analysis which is defined psychologically and in terms of behavior, which is amenable to quantification, and which can be obtained reliably has been developed by Stevenson (4) and used in several studies (3, 5, 6). The unit was termed a behavior unit, or *BU*, and was defined as a change in the relationship between a child and his environment, constituted by any observable change in either the child's immediate environment, his behavior, or both.

The method devised for dividing behavior into such units is cumbersome for the analysis of large amounts of information when it depends upon written records, which are tedious and time-consuming to gather and to examine. If a method could be devised which retained a unit of analysis similar to the *BU* but which avoided the gathering of written records, it would presumably have wide utility.

It is the purpose of this study to develop a method which eliminates written

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records and allows ratings of behavior categories to be made simultaneously with observation. This paper consists of a description of the method developed, an investigation of its reliability, and a study of the method applied to three groups of children.

B. METHOD OF ANALYSIS

1. *Unit of Analysis*

The behavior unit deals with molar responses, such as swinging, talking, or approaching a child, as contrasted with molecular responses such as raising the arm, moving the fingers, etc. The *BU* is determined whenever there is an observable change in *S*'s environment, which may or may not be followed by an observable change in *S*'s behavior. A *BU* also occurs when there is an observable change in *S*'s behavior, preceded or not preceded by an observable change in *S*'s environment. The majority of *BUs* may be interpreted as responses following the appearance of change of certain environmental stimuli; however, changes in environment do not always elicit new behavior, and some changes in behavior occur without a previous change in the environment.

There are, to summarize and give examples, three conditions by which *BUs* are created: (a) an observable change in the environment followed by an observable change in *S*'s behavior (Jimmy hits *S* and *S* hits back); (b) an observable change in the environment followed by no observable change in *S*'s behavior (Jimmy hits *S* and *S* continues playing as before); (c) no observable change in *S*'s environment prior to an observable change in *S*'s behavior (*S* hits Bill without provocation).

A further discussion of the *BU* may be obtained in a previous study (4).

2. *Definition of Variables*

Once the material has been divided into *BUs*, it is possible to rate the *BUs* for any number of behavior categories which may be defined. For the present study two categories were defined, Social Participation (*SP*) and Contacts with Adults (*A*).

a. *Social Participation*. A *BU* is rated for *SP* whenever *S* interacts with or has the opportunity for interaction with other children. Three levels of behavior are defined in *SP*, Interactive, Attentive, and Non-interactive. Definitions of the levels are presented below:

Level 1. Interactive. This level includes all behavior in which *S* interacts with another child by means of a direct verbal or physical approach or

response, or by a movement or posture which communicates ideas or affect to another child.

Level 2. Attentive. This level includes all behavior often described as "Parallel" or "Onlooker." The *S* is with another child without interaction or communication, but his behavior is dependent upon the other child's presence, or is indirectly stimulated or affected by that of the other child; or the *S* may be playing by himself but is watching another child and is directing his attention towards the other child's activities.

Level 3. Non-interactive. This level includes all behavior in which *S* is engaged in individual or isolate activity, making no attempt to communicate with other children or to respond to their attempts to communicate with him. The *S* shows disinterest in other children for the moment at least, and his behavior is not influenced by their activities, though he may be in physical proximity to another child or engaged in a similar activity. The *S* uses withdrawal and avoidance rather than active repulsion, which would be rated at Level 1.

b. Adult Contact (A). All behavior in which *S* has any individual contact with an adult is checked under *A*, such as when *S* asks an adult for help, comfort, support, or direction; when *S* initiates or responds to conversation with an adult; or when there is any individual exchange with an adult within routines or adult-led group activities. *A* usually, but not necessarily, precludes rating the same *BU* for *SP*. If *S* is interacting primarily with an adult while another child is present—that is, if *S* responds to the situation because of the adult's presence—the unit is rated only for *A*. If, however, *S* is interacting simultaneously with an adult and with another child, the *BU* is rated for both *A* and *SP*.

C. PROCEDURE FOR SIMULTANEOUS OBSERVATION AND RATING

Familiarity with the observation of children, with the process of dividing written observations into *BUs*, and with the definition of the behavior categories being studied, is necessary for individuals attempting to use this method. A check list consisting of the categories and their levels is useful. The observer is instructed to check every time a *BU* occurs and at the same time to rate each *BU* for the relevant behavior categories.

This method requires intense concentration; therefore, the period of observation should be shorter than that ordinarily used in the collection of written observations. The amount of time spent in observation is somewhat dependent upon the nature of the categories being rated, because for less fre-

quently occurring types of behavior longer periods of observation may be needed to obtain an adequate sample.

D. RELIABILITY OF THE METHOD

A study was made to assess the reliability of the method.³ Children in a nursery school setting were individually observed simultaneously by three observers, who mentally divided the behavior into *BUs* as they observed and rated the *BUs* according to levels of *SP* and *A*.

1. Subjects

The *Ss* consisted of a group of nine children, five boys and four girls with *CA*'s from 3.5 to 4.7 years, attending the Home Economics Nursery School at the University of Texas.

2. Procedure

Three observers (senior students in psychology) participated in the reliability study. All had been well trained in the method of observation and had participated in the construction of the categories used. Four 5-minute observations were made of each *S* over a two-week interval. Observations were made only during free-play periods. The sequence in which *Ss* were observed was according to a random sequence determined prior to the time of observation. Half the observations of each *S* were made indoors and half outdoors, to insure that the conditions of observation would be similar for each *S*. Each observation was made simultaneously by the three observers. One of the observers indicated to the others when the observation was to begin and when it was to end.

The observers made no written records. On a rating sheet each *BU* was noted with a check and an appropriate rating. Symbols were used to indicate the level of *SP* and whether the interaction took place with an adult.

3. Results

The degree of agreement with which the observers divided the behavior into *BUs* was determined by use of *W*, Kendall's coefficient of concordance (7, p. 284). The total number of *BUs* obtained for each child by each observer was entered into a nine-by-three table with the observers heading

³ We wish to thank John Kregarman, Gary Martin, and Mary Bess Whidden, who assisted in this project and did the observations of the children. We also wish to thank the staffs of the Home Economics Nursery School of the University of Texas and of the Preschool of the Austin Council for Retarded Children, for their cooperation in making subjects available for this study.

the columns and the children heading the rows. The value of W obtained was .80, which is highly significant statistically. Observers A and B differed by an average of four BUs for each 5-minute period, B and C by six BUs , and A and C differed by an average of 10 BUs . The average number of BUs per 5-minute observation for all three observers was 41.1.

The most meaningful and useful index related to observers' ratings is the proportion of total BUs rated for each category or level. Consequently, for each child the proportion of Level 1/ ΣBU , Level 2/ ΣBU , Level 3/ ΣBU , and 4/ ΣBU , was determined for each observer. The values of W obtained were, respectively, .94, .91, .87, .89. These values are in all cases higher than that obtained for the division of behavior into BUs , and indicate a high degree of agreement among the observers in rating BUs for category and level. The high similarity in the four values of W is due in part to the interdependence of the ratings, for a child with a high frequency of ratings at Level 1, for example, would be likely to have a lower frequency of ratings at Level 3, etc.

In summary, the results indicate that the method can be used with very satisfactory reliability for the time period and the categories used.

E. STUDY OF THREE GROUPS OF CHILDREN

The usefulness of the method in finding possible group similarities and differences was investigated by studying two additional groups of children, a second group of normal preschool Ss and a group of mentally retarded children. These divergent groups were chosen to determine whether, with a small number of Ss , the method showed significant differences in the types of behavior manifested by the different groups.

1. Subjects

Ten children attending the Home Economics Nursery School comprised one of the groups observed. There were five boys and five girls in this group with CA 's from three to four years. The second group consisted of seven children attending a nursery school for mentally retarded children. There were four boys and three girls in this group; their CA 's ranged from three to six years, and their MA s from one and one-half to three years. The programs of the nursery schools were similar in that both were on half-day schedules and were supervised by one teacher and an assistant.

2. Procedure

The observers who conducted the reliability study again observed and rated the children's behavior. Each S was observed by only one observer at a time.

Four 5-minute observations were made of each *S*, two indoors and two outdoors, and again the *Ss* were observed only during free-play periods. The observational schedule was constructed so that the observers were assigned randomly to *Ss* and so that each *S* was observed equally often early and late in the morning. The behavior was rated for level of *SP* and for *A*.

3. Results

For each *S* the proportions of total *BUs* involving behavior at *SP* 1, 2, or 3, and *A* were computed. The average values for each group for each of these measures are presented in Table 1. The group used in the reliability study is designated as Group I, the group of 3-year normal *Ss* is designated as Group II, and the group of retarded *Ss*, Group III. The data presented for Group I are based on the average of the results obtained for each *S* by the three observers.

TABLE 1
THE AVERAGE RATINGS FOR EACH OBSERVATION OF THE THREE GROUPS OF *Ss*

	I	Group II	III
Level 1/ Σ <i>BU</i>	.20	.20	.06
Level 2/ Σ <i>BU</i>	.38	.40	.24
Level 3/ Σ <i>BU</i>	.22	.22	.29
<i>A</i> / Σ <i>BU</i>	.22	.22	.45
No. <i>BUs</i>	41.1	38.2	36.8

It can be seen that there are striking similarities in the values obtained for Groups I and II. The average proportions for the four possible ratings differ by a maximum of .02. The totals of the proportions for each group are equal to more than 1.00 because *BUs* are sometimes rated for both *A* and *SP*.

Quite different results are found when either Group I or II is compared with Group III, the retarded *Ss*. The results of Group II, rather than of Group I, were compared with those of Group III, because of the greater similarity of manner in which the data were collected. For these analyses, Festinger's "d" test was employed (2). The number of *BU*'s do not differ significantly ($p > .05$). The difference in proportion of Level 1/ Σ *BU* is significant at between the .01 and .05 levels. The difference for Level 2/ Σ *BU* is significant at beyond the .01 level, and the difference for Level 3/ Σ *BU* is not significant ($p > .05$). The difference for *A*/ Σ *BU* is also significant at beyond the .01 level. To summarize, the retarded children had significantly lower proportions of social interaction at Levels 1 and 2 and a significantly higher proportion of contact with adults.

The data for Groups I and II were combined and each category and level was analyzed for sex differences. The values for Group I were based upon the average values for the three raters. The results appear in Table 2. With regard to the total number of *BU*'s and the proportions of *BU*'s at Levels 2 and 3, the results for boys and girls are highly similar. There is, however, a highly significant difference in the proportion of *BU*'s rated at Level 1 ($p < .01$), with the boys having much more interactive play. The proportion of *BU*'s checked for *A* also differs for the boys and girls, but the difference is not statistically significant. A difference of this type was recently found in another study (5).

TABLE 2
THE AVERAGE RATINGS FOR EACH OBSERVATION OF GROUPS I AND II BY SEX

	Boys	Girls
Level 1/ Σ <i>BU</i>	.28	.13
Level 2/ Σ <i>BU</i>	.35	.39
Level 3/ Σ <i>BU</i>	.23	.25
<i>A</i> / Σ <i>BU</i>	.18	.26
No. of <i>BU</i> s	40.1	39.4

F. DISCUSSION

The advantage of the method described lies in the fact that observation and rating of children's behavior are accomplished simultaneously. In addition, observers are able to incorporate more data in each observational period than can be obtained from a written record. This is reflected in the fact that in this study the average number of *BUs* for each 5-minute observation was 41, while in a previous study employing written observations (5), the average number of *BUs* per 5-minute period was 11.1. Even though the ratings were done in the latter study with high reliability, the observers were necessarily highly selective and unavoidably condensed behavior to a considerable degree in making their written records.

Additional advantages of the method are that it provides a means for quantifying children's behavior, and that it permits evaluation of behavior in terms of each child's own activity level, rather than in terms of an external referent such as time or frequency. A proportion, such as Level 1/ Σ *BU*, provides more information about the social interaction of a child than does a frequency count of instances of social interaction during a specified period of time, since it takes into account *S*'s activity level during the period.

Intense concentration is required to observe, analyze, and rate rapidly changing behavior on the spot. Although very satisfactory reliability coeffi-

cients were obtained for 5-minute intervals, it is felt that the use of longer time intervals with broad categories such as those used in the present study would probably reduce the reliability of the method.

The method prohibits, as does any on-the-spot method of rating, the re-examination of the protocols for content of the observation or for rechecking ratings. Consequently the method is most useful in studies of the social behavior of children in a group situation. It is of less value in individual case studies or in studies of personality variables, where the use of written observations probably will remain the most satisfactory method of obtaining data.

G. SUMMARY

A method was developed for the simultaneous observation and rating of behavior, based upon the division of behavior into psychologically defined units. The division and rating of the three levels of social participation and contacts with adults were accomplished with high reliability. Similarities were found between two groups of normal children and differences were seen between both these groups and a mentally retarded group. The advantages of the method over earlier methods and difficulties encountered in the use of the method were discussed.

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THE EFFECTS OF ELECTROCONVULSIVE SHOCK ON EMOTIONALITY AND AUTONOMIC RESPONSE TO SUBSEQUENT STRESS IN THE RAT*

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A. INTRODUCTION

There are no reports in the literature, known to this author, which indicate less "emotional" behavior in rats which have been subjected to electroconvulsive shock (ECS). There are reports noting increased emotionality which persists over time (8, 9), and one report of transitory increases in emotional behavior (5). The present paper deals with the observance of significantly less "emotionality" in rats subjected to 15 ECS compared with rats not convulsed. "Emotionality" has been defined as the observable behavior the rat makes to the mildly stressful, novel experience of being placed in an enclosed field.

If "emotional" animals respond differently to stress one should expect also to find changes in physiological activity under stress conditions which would characterize the "emotional" animal. Data are presented which deal with the gross "emotional" behavior before stress and selected physiological measures obtained under stress conditions from two groups of albino rats, one of which had been given a series of electroconvulsive shocks. Specifically, data are presented which relate to (1) "emotionality" following ECS, (2) the differences between ECS and non-ECS animals in heart rate and body temperature responses to the stress of 24 hours of immobilization, (3) the relationship of measures of "emotionality" to autonomically mediated responses under stress and (4) the incidence and severity of stomach lesions in convulsed and non-convulsed animals following immobilization-stress.

B. METHOD

1. *Subjects*

Thirty 135-160-day-old male albino rats of the Sprague-Dawley strain were used as subjects. Fourteen of the animals had received a series of 15 ECS given one per day beginning at age 80-90 days. All were maintained on

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a water deprivation schedule for approximately 30 days between the date of the last ECS and immobilization but had been on ad lib food and water for at least a week before being subjected to the stress experience. The 16 control animals were handled in the same manner as the ECS group except for the actual passage of the convulsing current.

2. Apparatus

ECS was administered by means of equipment described in general elsewhere (8). Briefly, 58 ma. were delivered to the ears for 0.3 seconds. The transformer output was 2000 volts, 60 cycles and was controlled by a timer on the primary. The enclosed field consisted of a 3×5 foot sheet of plywood painted flat black and surrounded by a 24-inch galvanized sheet metal wall. The unit was placed on the floor in a well lit room under two double bulb fluorescent light which were suspended approximately 90 inches from the floor, one over each end of the field. Measures taken were the number of 1 foot squares entered (Sq.) and the number of times an animal reared on its hind legs (R) during a two-minute period in the field.

Immobilization was accomplished by wrapping each animal first in two-inch gauze and then in a plaster of paris bandage, forming a closely fitting rigid cocoon around the animal. Immediately before immobilizing an animal, heart rate leads were attached, one over the heart and another over the right rear hip by means of surgical skin clips. Heart rates were recorded by means of a Gilson EEG amplifier and ink writer. Body temperature was obtained by taping a Yellow Springs banjo type thermistor to the shaved abdomen over which one of the hind legs was folded when the animal was immobilized. Temperature was measured with a Yellow Springs Telethermometer and written on the heart rate record.

3. Procedure

The day before they were to be immobilized animals were observed in the enclosed field. All animals were immobilized with heart rate leads and thermistors in place between 35 and 45 days after the last ECS was administered. The first recording was made one hour after immobilization because of the difficulty in obtaining artifact-free heart rate recordings earlier, while the animals were struggling in the cocoon. Recordings of heart rate and body temperature were made 1, $2\frac{1}{2}$, $3\frac{1}{2}$, $4\frac{1}{2}$, and $22\frac{1}{2}$ hours after immobilization. Values employed for the variables of heart rate and body temperature were based on the average of eight 15-second periods taken from a five-minute consecutive recording at each of the above noted times. The

equipment available limited the number of recordings which could be made at one time to four or five and generally four animals were used each day.

After the last recording had been obtained all animals were sacrificed and the stomachs inspected for lesions. Lesions were rated on a 5 point scale from 0 to 4. Zero indicated a grossly normal stomach; "1" scattered petechiae; "2" irregularity of the mucosal lining; "3" a clearly defined erosion of the mucosa; "4" the most severe lesion, a palpable defect which almost invariably included congealed blood at the base of the crater. Seventeen stomachs were rated independently and identically by another person in previous work. It is on the basis of this perfect agreement that the reliability of the ratings is considered very high.

4. Results

a. Emotionality. The first comparisons made concerned the number of squares entered (Sq.) and number of times the animals reared on the hind legs (R) during the two-minute period in the enclosed field. Contrary to some findings (8, 9) our data indicate that the ECS animals were significantly less emotional than the non-ECS animals. The average value of "Sq" in the ECS group was 33.07 ± 9.91 ; Non-ECS group "Sq" mean was 22.50 ± 9.07 ; difference = 10.57; $t = 3.04$; $P = .01$. For "R" the ECS group average was 8.86 ± 3.73 ; Non-ECS group average for "R" was 5.22 ± 2.34 ; difference = 3.64; $t = 3.14$; $P = .01$.

b. Heart rate. The heart rates obtained in the two groups are presented in Figure 1. The non-shocked group had a consistently higher rate than the shock group although the only time at which the difference reached statistical significance was $22\frac{1}{2}$ hours after immobilization: $D = 72.43$; $t = 3.84$, $P = .01$.

c. Body temperature. Temperature levels and changes in temperature for the two groups are illustrated in Figure 2. In general the temperature curves are highly similar in form to those obtained for heart rate. In fact, heart rate and body temperature correlated $+.82$ to $+.86$ at various times during immobilization. The temperature values in the two groups do not differ significantly at any point although the trend which exists suggests that if observed for a longer period, the divergence noted might have increased.

d. Stomach lesions. All but one animal showed lesions in the fundus of the stomach after immobilization. Two possible explanations for this high incidence of lesions present themselves. Previous work in our laboratories (7) indicated that at ages over 90 days the incidence of immobilization induced lesions in rats increases sharply. The animals in this study were

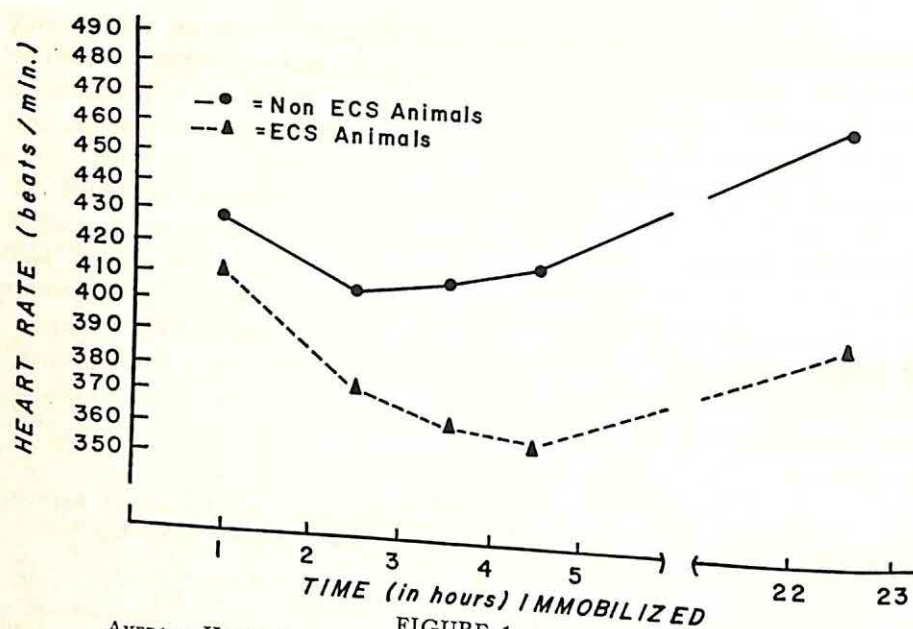


FIGURE 1
AVERAGE HEART RATE IN TWO GROUPS OF RATS AT VARIOUS TIMES
DURING IMMOBILIZATION

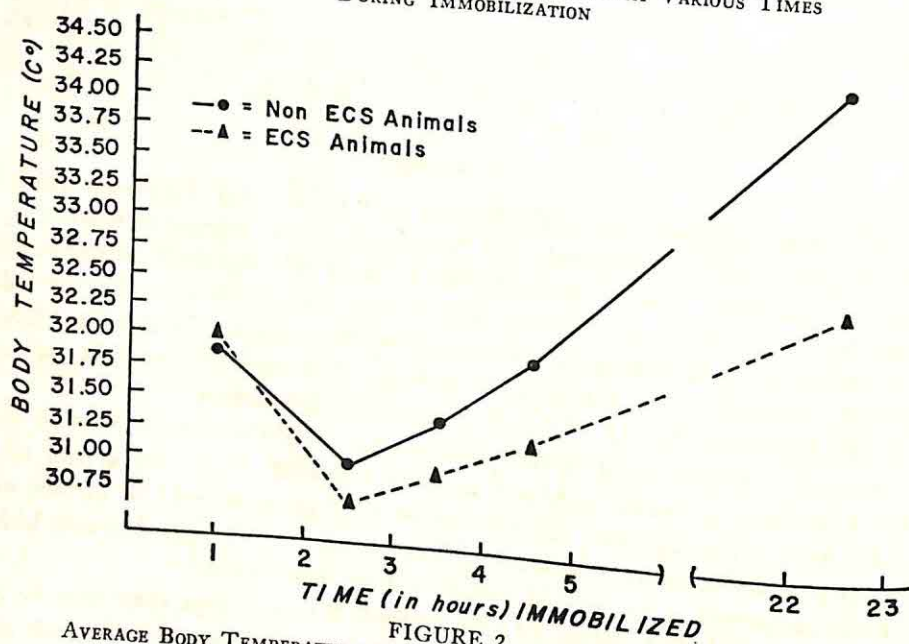


FIGURE 2
AVERAGE BODY TEMPERATURE IN TWO GROUPS OF RATS AT VARIOUS TIMES
DURING IMMOBILIZATION

between 135 and 160 days of age when stressed. A second contributing factor may have been the short period between the water deprivation schedule and the stress of immobilization. At any rate, the expected relationships between incidence of stomach lesions and the variables of emotionality, and autonomic activity were not found.

The data from both groups were combined in order to determine the relationship between measures of emotionality and the autonomic variables of heart rate and body temperature. The values of "heart rate change" and "temperature change" were the differences between the first and last recording of each variable. Table 1 presents these data. It can be seen that the behavioral variables (Sq and R) are not significantly interrelated while both correlate just short of the .01 level with measures of change in each of the autonomic variables.

TABLE 1
INTER-CORRELATIONS BETWEEN NUMBER OF SQUARES ENTERED AND AMOUNT OF REARING
IN THE ENCLOSED FIELD, AND HEART RATE AND BODY TEMPERATURE VARIABLES
IN ALL ANIMALS AS A SINGLE GROUP

	HR ₁	HR ^Δ	Temp ₁	Temp ^Δ	"R"
"Sq"	-.18	-.41*	-.06	-.43*	+.30
"R"	+.03	-.43*	+.10	-.44*	
HR ^Δ				+.63**	

* = Significant at .05 level.

** = Significant at .01 level.

Δ = Reading #5—Reading #1.

C. DISCUSSION

The data presented here indicate that, contrary to some previous reports, ECS may result in significantly less "emotionality" as defined by activity in an enclosed field. The smaller increases in heart rate and body temperature seen in the ECS and non-ECS animals during immobilization is interpreted as corroborating the behavioral evidence of less "emotionality" following ECS. Neither the behavioral data nor the autonomic changes observed appear to justify the notion that 15 ECS result in general debilitation.

Stern (8) has discussed possible factors which might determine whether or not differences in emotionality are observed following ECS. Strain and sex differences, equipment used and number of ECS given as well as differences in observational techniques used are factors mentioned. The significance which can be attributed to the several variables is far from clear.

Braun, Russel, and Patton (3) have raised the point that there may be a change similar to "... the shift from the shock to the countershock phase of

Selye's alarm reaction phase" which occurs at some point between the tenth and fifteenth ECS. If this shift does in fact occur several direct implications for ECS research become apparent. First, the point raised by Braun et al. (3) regarding the importance of controlling the parameters involved in the application of convulsive shock is reemphasized. Secondly, this would suggest that the "stress value" of one or a number of ECS might be described quantitatively in terms of behavioral and physiological responses to various other stimuli or stressors. The interaction of major relevant variables such as number of ECS and time intervening between ECS and subsequent stress should be studied with respect to the development or loss of "resistance" as begun by Griswold and Gray (4).

In this regard, it has been suggested by several writers (1, 2, 4) that repeated stimulation of the sympathetic system tends to raise the threshold to such stimulation on subsequent occasions. Furthermore, Griswold and Gray (4) have found that several ECS's protect rats against usually fatal amounts of tumbling, a resistance enhancing effect demonstrated earlier by Noble (6) relative to tumbling.

The degree of correlation between the enclosed field data and the changes noted in heart rate and temperature during immobilization is an incidental bit of evidence which is considered to support the validity of enclosed field behavior as indicators of emotionality.

D. SUMMARY

Two groups of male albino rats were subjected to the stress of 24 hours of immobilization after one group had been given a series of 15 daily ECSs. Contrary to some previous reports, the ECS animals showed significantly less "emotional" behavior in an enclosed field than the non-convulsed group. The ECS animals demonstrated less heart rate increase (.01 level) and less body temperature increase (not significant) during 24 hours of immobilization. These data are considered to be consistent with the suggestions made in the literature that a certain number of ECSs, probably between 10 and 15, result in a significant increase in resistance to stress of several types. The present findings do not appear to be consistent with a postulated debilitating effect of ECS.

The relationships between both heart rate and body temperature changes and enclosed field data are interpreted as support for the validity of enclosed field measures as indicators of emotionality.

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CHILDREN'S CONCEPTIONS OF RIGHT AND LEFT: PIAGET REPLICATION STUDY IV*

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A. INTRODUCTION

This is the fourth² in a series of systematic replications of experiments originally performed by the Swiss psychologist, Jean Piaget. For its starting point this fourth replication takes Piaget's (1929) experiment dealing with children's conceptions of right and left.

In the right-left experiment Piaget made one of his few attempts at using standardized tests and statistical procedures in the study of conceptual development. Piaget's tests differed, however, from those found in most intelligence scales in the sense that all the tests dealt with the same conception and varied only in the level of comprehension required for their solution. In examining 5- to 11-year-old children, Piaget found that his tests not only discriminated between age groups but also revealed three stages in the development of right-left conceptions. One purpose of the replication study was to compare Piaget's results, obtained from Swiss youngsters, with those obtained from testing American children.

B. METHOD

1. Subjects

Two hundred and ten Jewish children attending a day camp³ in Westwood, Massachusetts, were tested. The sample consisted of 30 subjects at each year level, from five to 11, who were randomly selected from a total camp population of over 800 children. The children came from many different sections of the Boston area, from many socio-economic levels and

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¹ This study was carried out while the writer was consultant to the Cambridge Child Guidance Center. To Dr. Robert Reid, Director of the Clinic, and to Dr. Charles Hersch, Chief Psychologist, the writer is greatly indebted for support and encouragement.

² For the first three studies in the series cf. Elkind (1961a, 1961b, 1961c).

³ The study was made possible through the courtesy of The Jewish Centers Associations of Greater Boston. Mr. Louis Lowy, Camp Coordinator, and Mr. Leonard I. Nemeth, Summer Day Camp Director, gave generously of their time and administrative skills. To these men and to the many counselors, without whose help the study could not have been made, the writer owes many thanks.

from public, private and parochial schools. It was assumed that the heterogeneity of the sample in these respects compensated for the ethnic homogeneity of the group and that it was a fairly representative sample of Boston area school children. The mean age and standard deviation for each age group is given in Table 1.

TABLE 1
MEAN AGE AND STANDARD DEVIATION FOR SEVEN AGE GROUPS USED IN REPLICATION STUDY
N = 30 AT EACH AGE LEVEL

Age group	Mean age	SD (mo.)
5	5-7	1.33
6	6-4	2.77
7	7-6	2.65
8	8-5	2.66
9	9-4	2.96
10	10-6	2.87
11	11-4	3.44

2. Tests and Procedure

Piaget used six tests in his experiment, two of which proved to be of no special discriminative value. In the present study tests 4 and 6 (suggested but not used by Piaget) were substituted for the two tests which he found non-discriminating.

1. Show me your right hand. Your left. Show me your right leg. Now your left.

2. Show me my right hand. Now my left. Show me my right leg, now my left. (During Tests 1 and 2, S sat opposite E.)

3. (The child was opposite two objects, a penny to his left and a pencil to his right.) Is the pencil to the right or to the left of the penny? And is the penny to the right or to the left of the pencil?

4. (After Test 3 the child went around the table and sat beside E. The pencil and coin were left untouched.) Now is the pencil to the right or to the left of the penny? And the penny?

5. (The child was opposite three objects in a row: a pencil to his left, a key in the middle and a penny to his right.) Is the pencil to the left or to the right of the key? And of the penny? Is the key to the left or to the right of the penny? And of the pencil? Is the penny to the left or to the right of the pencil? And of the key? (During Test 5, S was facing E.)

6. (After Test 5, the child went around the table and sat beside E. The objects were left untouched.) The questions asked for Test 5 were then repeated with the child in his new position.

3. Scoring

In Piaget's study a test was passed only if the child answered all its questions correctly. Spontaneous corrections and corrections made after errors of inattention were, however, also scored as correct. The same method of scoring was used in the present study.

C. RESULTS

1. Tests of Right-Left Judgment

Piaget found that his tests discriminated between age groups and he reported the age levels at which 75 per cent of his subjects passed each test. In Table 2 the age levels at which the tests were passed by Piaget's subjects are compared with the age levels at which they were passed by subjects in the replication study. As Table 2 shows there was no more than a year's discrepancy between the results of the two investigations. Taking into ac-

TABLE 2
COMPARISON OF ORIGINAL AND REPLICATION STUDIES FOR AGE LEVEL PLACEMENT
OF TESTS—CRITERION FOR PLACEMENT = 75 PER CENT PASSING

N	Study	Tests					
		1	2	3	4 ^c	5	6 ^c
200+	Original ^a	5	8	7	—	11	—
210	Replication ^b	5	7	8	9	10	10

^a Number at each age level not reported.

^b Thirty subjects at each age level.

^c Tests which differed from those used by Piaget.

count the cultural differences between the two groups, the fact that the investigations followed one another at a thirty-year interval and the ever present errors of sampling, the agreement shown in Table 2 is rather striking.

The close agreement between the original and replication results speaks well for Piaget's assertion that the tests were measures of mental development, and not of incidental experiential factors. Although he did not present the figures, Piaget stated that the tests were passed with increasing frequency with increasing age. This assertion was supported by the results shown in Table 3. In sum the quantitative results of the present study agreed with Piaget's finding that the right-left tests discriminated between age groups and with his assertion that they were developmental measures.

2. Stages of Right-Left Development

By examining the errors which children made on his tests, Piaget was able to distinguish three stages in the development of right-left conceptions.

TABLE 3
PER CENT OF SUBJECTS PASSING "RIGHT" AND "LEFT" TESTS FOR SEVEN AGE GROUPS
N = 30 AT EACH AGE LEVEL

Age group	Tests					
	1	2	3	4	5	6
5	83 ^a	20	53	10	3	0
6	74	40	40	20	10	3
7	100	77 ^a	57	33	20	10
8	100	83	90 ^a	47	43	47
9	100	93	83	77 ^a	74	63
10	100	97	90	87	87 ^a	87 ^a
11	100	100	97	93	80	83

^a Age level at which test was placed by 75 per cent passing criterion.

Piaget, however, did not elaborate on these stages and the present writer is responsible for the explicit formulation of the stages which is given below.

Stage 1. At the first stage, extending usually to Ages 7-8, the child's conception of right and left was paradoxically both under and over-differentiated. It was under-differentiated in the sense that though the child knew his own right and left (Test 1 passed at Age 5) he failed to distinguish these from the right and left of the person facing him (Test 2 not passed until Ages 7-8). The child's conception was over-differentiated in the sense that he seemed to regard right and left as applicable to arms and legs but not to objects (Test 3 not passed till Ages 7-8). In view of this paradoxical over- and under-differentiation, children at the first stage had a conception of right and left that was non-differentiated or global.

Stage 2. Children at the second stage, usually from Ages 7-8 to Ages 10-11, had a concretely differentiated conception of right and left. Their conception was differentiated in the sense that the children distinguished their own right and left from that of a person facing them (Test 2 passed at Ages 7-8), and their conception was differentiated also in the sense that they discriminated how two objects stood to one another from one viewpoint, from how the objects stood to one another from a second viewpoint (Test 4 passed at Age 9). Nonetheless, at this stage children's conceptions of right-left were only concretely differentiated in the sense that these children failed to completely dissociate right and left from the objects to which they referred. They were able to dissociate their right-left judgments from objects only if some perceptual prop (another person or change of position) was given.

Stage 3. The third stage children, usually Ages 10-11, had a fully differentiated, abstract, conception of right and left. These children showed no hesitancy in saying that the middle of three objects was at the same time

"to the right" of one and "to the left" of the other (Test 5 passed at Age 10). Once they reached this level of conceptualization these children met no added difficulty in judging the three objects from a new point of regard (Test 6 also passed at Age 10). Third stage children were aware of the truly relational character of right and left, i.e., that these were terms with no fixed referents because they varied with the person making the judgment and with the positions of the things being judged. Right and left at this stage were abstract in the sense that they were conceived as relations dissociated (without perceptual props) from any particular contents.

3. *Characteristics of Right-Left Behavior*

Several qualitative features of children's right-left behavior which appeared during the original and replication studies reflected the difficulties children were having in forming abstract relational conceptions.

Piaget noted that in the young children there was a tendency to alter the wording of the questions when giving a reply. His young subjects said the penny was "on the left" and that the key was "in the middle" although the questions were phrased, "to the left, to the right." Similar verbalizations were observed in the younger children of the present study. They also said "on the left" and "in the middle," instead of "to the left, to the right," the phrasing used by *E* and the older children. Piaget argued that these alterations were not merely semantic but reflected a true difference in orientation. The altered verbal forms used by the younger children complimented their erroneous judgments. Both indicated that for young children right and left were not relative positions but absolute properties of things.

Particularly striking examples of this tendency to regard relations as absolutes appeared in children's responses to Test 4, the test suggested but not used by Piaget.

Pi, 7-6 (the coin was to Pi's left and the pencil was to his right, Pi was sitting opposite *E*). Is the penny to the right or to the left of the pencil? "The left." And the pencil? "The right." (Pi then walked around the table and sat beside *E*. The penny and pencil were left untouched.) And now is the penny on the right or on the left of the pencil? "The left." Really? "Yes." And the pencil? "The right." How did you do it? "Easy, I remembered how they were before."

Examples like Pi's were numerous and were the reason Test 4 was not passed until age nine. Even though Pi knew his own right and left, and correctly judged the right and left of a person opposite him, he still clung to the notion that right and left belonged to particular objects. The results

of Test 4 showed that the right-left discrimination found in young children (Swanson and Benton, 1955) was in no way an indication of an abstract right-left conception. Both Piaget's original study and this replication of it, give evidence that truly relational conceptions of right and left are the end products of a long and difficult developmental construction.

D. DISCUSSION

The results of this replication study were in close agreement with Piaget's original findings regarding: (a) the ages at which particular tests were passed, and (b) the three stages in the development of right-left conceptions. The discussion will briefly summarize, and comment upon, Piaget's interpretation of his results.

Prior to the right-left experiment Piaget had found that both language (Piaget, 1926) and reasoning (Piaget, 1928) were dependent upon the development of the child's ability to take and to coordinate several points of view at the same time. Piaget found that the development of this ability, which he called the socialization of thought, went through three age-related stages. At the first stage, extending to Ages 7-8, the child's thought was characterized by egocentrism, the tendency to take his own viewpoint as absolute. Then at the second stage, beginning at Ages 7-8 and continuing till Ages 10-11, the child was able to put himself in the place of other persons, but was not able to look at things from many points of view at once. Finally at the third stage, beginning at Ages 10-11, the child was able to take the points of view of many persons at the same time.

In discussing his results on the development of right-left conceptions Piaget sought to demonstrate the dependence of these relational conceptions upon the socialization of thinking. Children at the first stage, according to Piaget, failed to distinguish another person's right and left from their own because of their egocentric tendency to regard their own viewpoint as absolute. At the second stage children failed the three-objects-test (Tests 5 and 6) because they were only able to take other peoples viewpoints one after the other and not simultaneously. Finally Piaget argued that children at the third stage were able to conceive how the key could be both "to the right" and "to the left" at the same time because they were able to coordinate all possible points of view.

Apropos of this socialization interpretation of right-left development, a phenomenon observed during the course of the replication study deserves reporting. When judging two and three objects while facing *E* (Tests 3 and 5) a good number of the oldest children made errors because they *spon-*

taneously took *E's* point of view. When asked about this they said "I thought you meant from where you (*E*) were sitting." This tendency to judge things spontaneously from *E's* point of view never appeared before the age of nine but became increasingly frequent thereafter. Once children who judged in this way were cautioned to judge, "from where you are sitting," they made no further errors. There was thus a noticeable correspondence between the tendency to spontaneously take *E's* point of view and success with relational judgments in agreement with Piaget's interpretation.

Even though the socialization interpretation has observational support and is intuitively appealing, it lacks rigor. In fact the interpretation is so close to the observational level that there is a real question as to what it adds to the purely descriptive account of the stages in right-left development. Piaget was aware of this and regarded socialization as complimentary to a second, bio-logical interpretation. In the 1929 book he also gave this bio-logical interpretation. But unlike the socialization model, which has remained relatively unchanged (Piaget, 1950), Piaget's bio-logical model has undergone extensive revision and in a sense, formalization (Piaget, 1953). It would be misleading therefore to present a 1929 interpretation which is now of only historical significance. The job of interpreting the results of Piaget's early investigations in view of his later theorizing is a major task for the future.

E. SUMMARY

Two hundred and ten children, Ages 5-11, were tested in a systematic replication of Piaget's experiment on the development of right-left conceptions. Results of the original and replication studies were in agreement regarding the age levels at which particular tests were passed. There was also agreement on the three age-related stages in the development of abstract right-left conceptions. At the first stage, usually till Ages 7-8, the child had a non-differentiated conception of right and left; then at the second stage, usually Ages 8-10, the child had a concretely differentiated right-left conception. Finally at the third stage, beginning at Ages 10-11, the child had a fully differentiated or abstract conception of right and left. The discussion summarized briefly Piaget's "socialization of thought" interpretation of his results.

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EFFECTS OF ASPHYXIA NEONATORUM ON BEHAVIOR IN THE RHESUS MONKEY*

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A. PROBLEM

In a routine psychological evaluation of the learning abilities of a group of monkeys subjected to asphyxia neonatorum and a group of normal monkeys, certain differences in general reactivity were noted between the two groups. Asphyxial animals consistently required significantly less adaptation to new testing situations than did normal animals, and were noticeably less disturbed by extraneous distractions than were members of the normal group.

It was thus decided to further investigate these differences in a controlled observational study.

B. METHOD

1. *Subjects*

Subjects were six preadolescent rhesus monkeys which had been subjected to asphyxia neonatorum and five normal monkeys which served as controls. All subjects were between six months and 10 months of age. The technique for inducing asphyxia neonatorum in the monkey has been described elsewhere by Ranck and Windle (2). The range of asphyxiation times in the experimental group was from 11 to 16 minutes with a mean asphyxiation time of 14 minutes.

2. *Apparatus*

The observation room was a soundproof chamber nine feet by six feet by six feet with a one-way vision screen. Five stimulus objects were placed in fixed positions on the floor and were present throughout the entire observational study (Figure 1).

3. *Procedure*

All animals were placed individually and in random order in the observation room for 10-minute periods once a week for a total of 15 weeks. Observations were at approximately the same time of day each week. Behavior

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was recorded in 10-second intervals by an experienced observer, with the stipulation that any one behavioral act was not recorded more than once in a 10-second interval. Thus, the maximum score possible for any one behavior in the 10-minute observational period was 60.

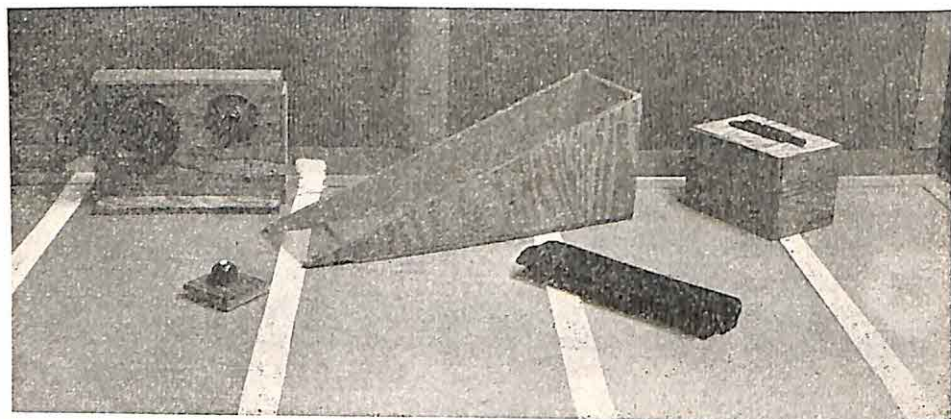


FIGURE 1
STIMULUS OBJECTS PRESENT DURING ALL OBSERVATIONS

Locomotion, contact, and emotionality scores were obtained by counting the number of times these particular behaviors occurred in each observational session. Locomotion was recorded whenever the animal moved his body from one place to another, irrespective of the type of locomotion involved. A contact was recorded whenever the animal in any way contacted one of the five stimulus objects in the room. The emotionality score was obtained by counting the frequency of occurrence of the following behaviors: (a) sucking, defined as insertion of any body part into the mouth; (b) convulsive jerking, defined as brief, quick movements of the body occurring repeatedly in a short time interval; (c) rocking, defined as rhythmic movement of the body back and forth while the animal is in a sitting position; (d) crouching, defined as placing the ventral surface of the body flat against the floor and arms and/or legs covering the face or head. These have previously been utilized as indicative of general emotionality in the young rhesus monkey (1).

C. RESULTS

The statistical significance of all results was tested by the Mann-Whitney U (3).

Figure 2 shows the average scores of locomotion over observation sessions. The asphyxial group locomoted significantly more ($p .05$) than did the

normal group. However, by the end of the observation series asphyxial group locomotion had leveled off, whereas the normal group had begun to locomote more frequently.

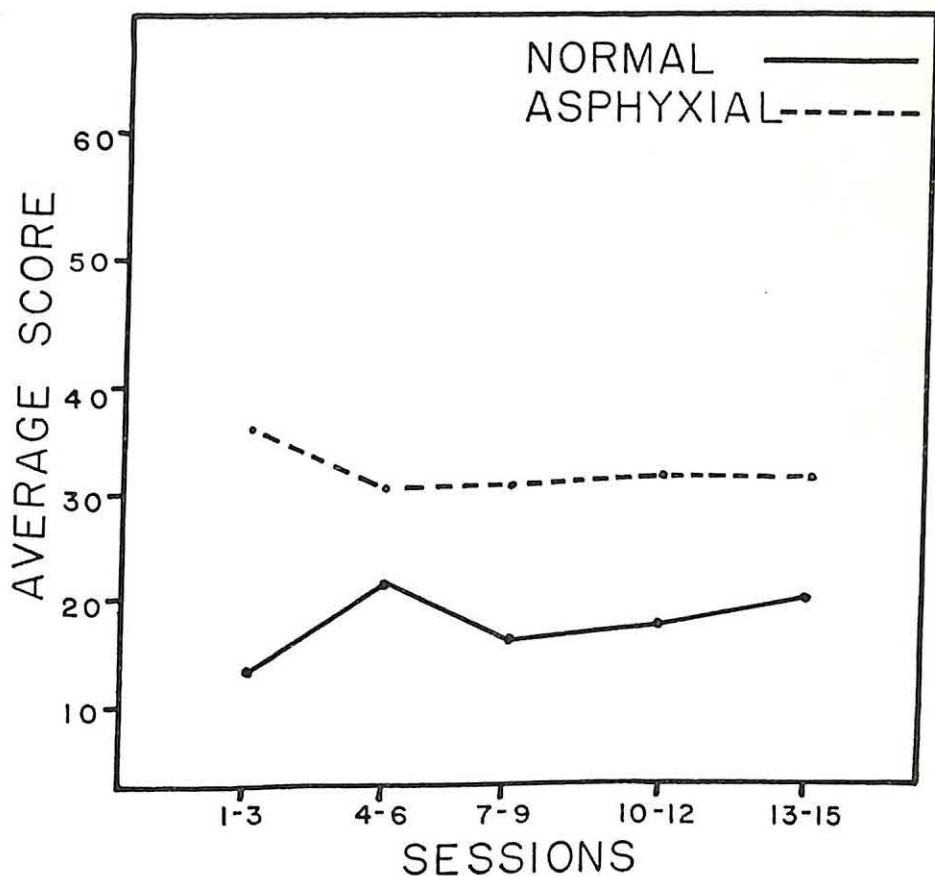


FIGURE 2
AVERAGE LOCOMOTION SCORES

The same trend is apparent in the contact scores (Figure 3), although group differences are not statistically significant. Initially, the asphyxial group consistently contacted objects in the room more frequently than did normals, but by the end of the observation series, the reverse was true.

Emotionality scores (Figure 4) show that normal subjects were significantly more emotional ($p .01$) than asphyxial subjects when the previously defined behaviors are accepted as the criteria of emotionality.

D. DISCUSSION

When placed in an unfamiliar environmental situation, young monkeys which had been subjected to asphyxia neonatorum began to actively explore the environment immediately, whereas normal control animals required a number of exposures to the situation before they initiated exploratory activity.

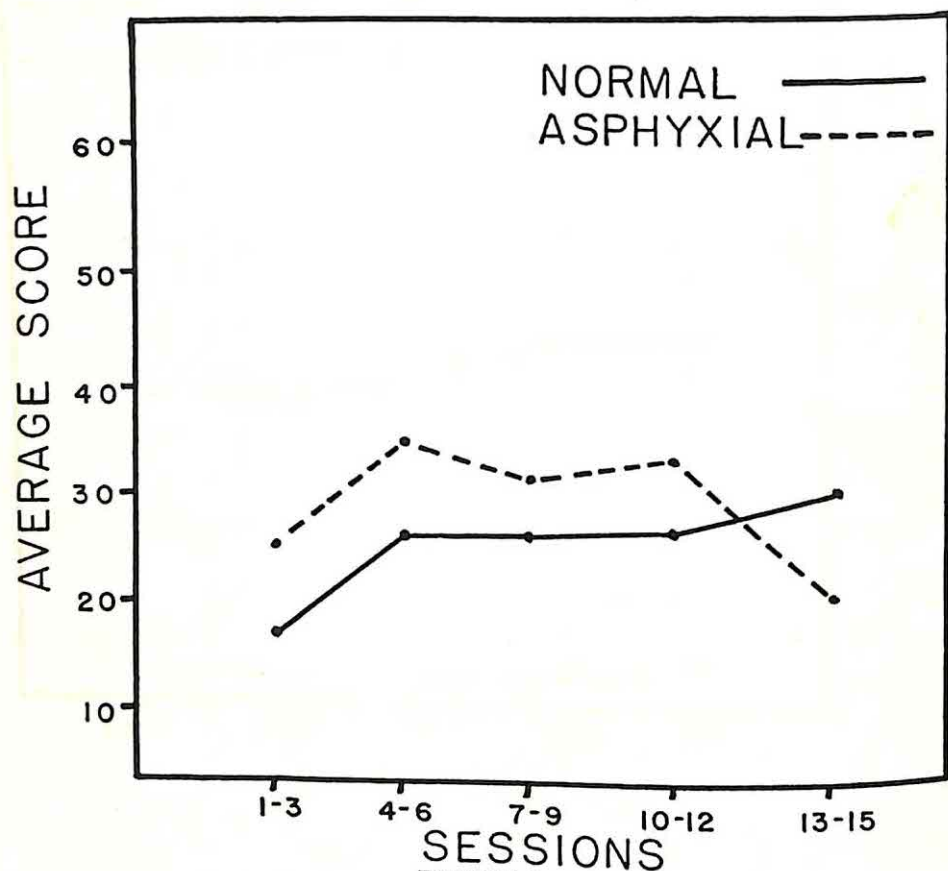


FIGURE 3
AVERAGE CONTACT SCORES

The much greater emotionality exhibited by the normal animals most probably accounts for the differences between groups in locomotion and contact scores.

Presumably, with additional exposures to the "open-field" type situation, the emotionality scores of the normal group would tend to decrease, whereas normal group locomotion and contact scores would be expected to increase

until more complete adaptation or satiation occurred. Whether the significant differences between groups in reactivity to environment found in this study would then continue to exist is a question for future investigations.

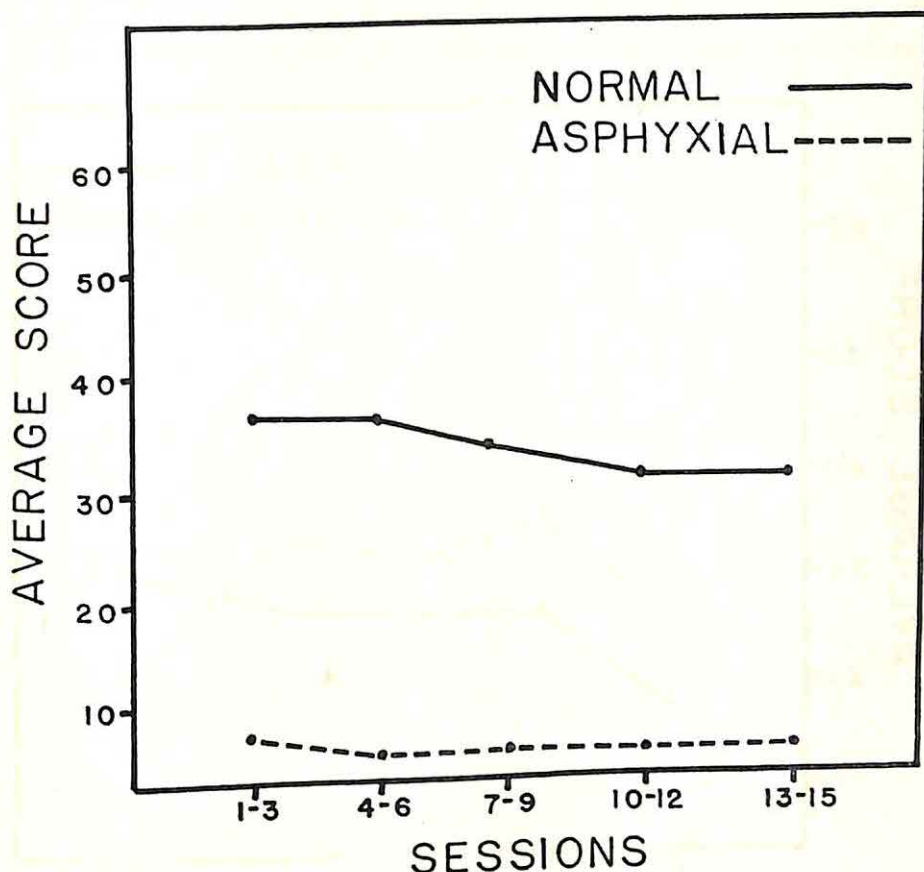


FIGURE 4
AVERAGE EMOTIONALITY SCORES

E. SUMMARY

Systematic observations of preadolescent monkeys subjected to asphyxia neonatorum and normal control monkeys showed differences between groups in general reactivity to environment surroundings. Asphyxial subjects locomoted significantly more, tended to contact objects more, and were significantly less emotional than normal subjects.

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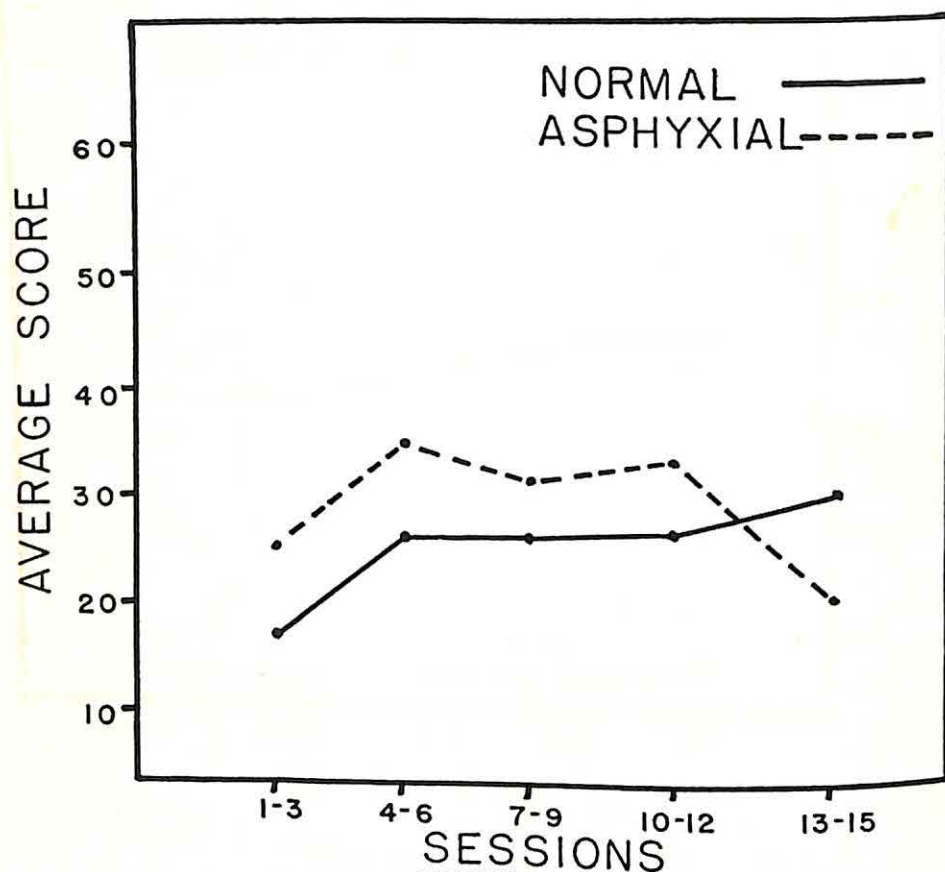


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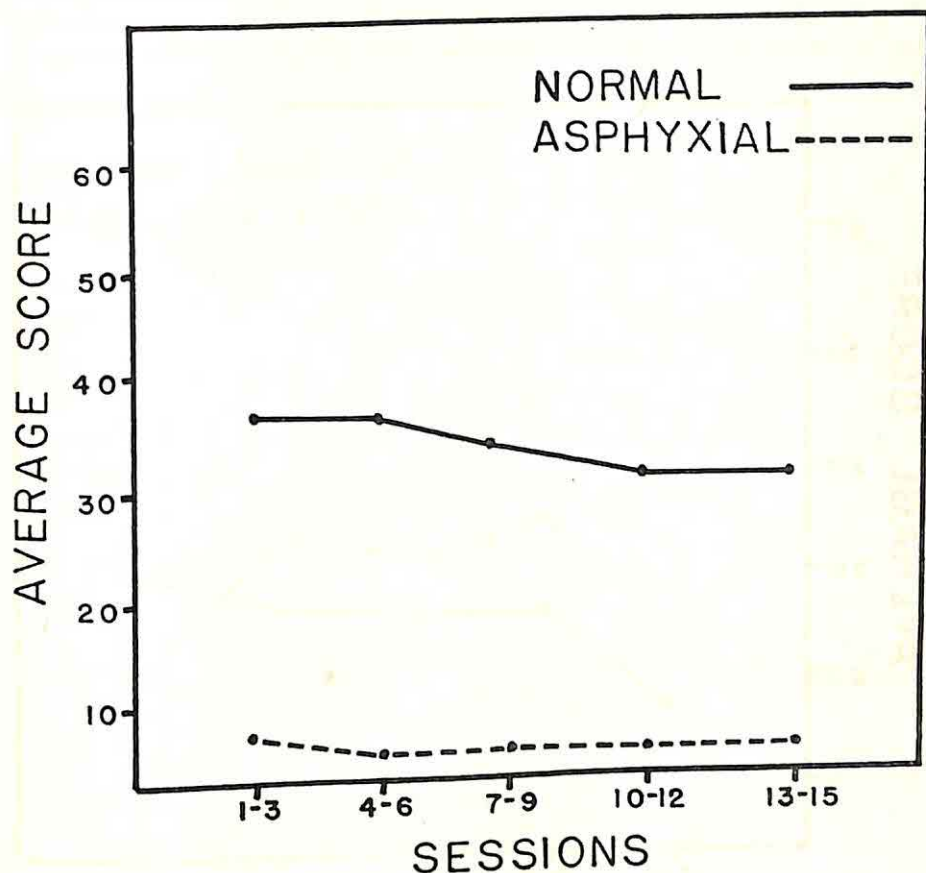


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DIFFERENCES IN REACTIVITY BETWEEN ASPHYXIAL AND NORMAL RHESUS MONKEYS*

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SUE V. SAXON

A. INTRODUCTION

In a previous investigation (2), it was found that asphyxial monkeys in a controlled observational situation initially showed more locomotion, more stimulus contacts, but significantly less emotionality than normal monkeys. The present experiment was designed to further explore such differences in general reactivity between the two groups.

B. METHOD

1. *Subjects*

The subjects, which were between 10 months and 14 months of age, were six rhesus monkeys which had been subjected to asphyxia neonatorum and five normal control monkeys. All had served in an earlier experiment published in this Journal (2).

The technique for inducing asphyxia neonatorum has been reported by Ranck and Windle (1). The range of asphyxiation times in the present experimental group was from 11 to 16 minutes with a mean asphyxiation time of 14 minutes.

2. *Apparatus*

The animals were observed in a soundproof chamber nine feet by six feet by six feet through a one-way vision screen. In order to more accurately follow and record locomotion patterns, the floor was divided into 15 squares by white painted lines.

3. *Procedure*

All animals were observed individually four times a day for a total of eight days (32 sessions). Each observational session lasted three minutes and behavior was recorded in 15 second blocks by an experienced observer with the stipulation that any one behavioral act was not recorded more than once in any 15 second period.

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Four different stimulus conditions were used throughout the experiment and each condition was presented alone to the animal in the observational situation once a day. Since two observational sessions were scheduled in the morning and two in the afternoon at approximately equal intervals, the order of stimulus presentation was predetermined so that at the end of the eight experimental days each stimulus condition had appeared at least once at each of the four daily observation times.

The stimulus conditions were designated as Simple, Intermediate, Complex, and Empty.¹ The stimulus for the Simple condition was a plain, unpainted block of wood 6 inches by 1½ inches by 2 inches, the Intermediate stimulus was a similar piece of wood painted red and white, and the Complex stimulus was a child's pull-toy 6 inches by 1½ inches by 2 inches in the form of a bug painted red and white with accessories such as wings, eyes, and antennae attached. In the Empty condition the animal was merely observed in the empty room for the prescribed time period.

Locomotion, contact, and emotionality scores have been defined and obtained as in the previous study (2).

C. RESULTS

All statistical comparisons were tested by the Mann-Whitney U (3).

1. *Intra-Group Comparisons*

Only two intra-group comparisons were found to be significant: (a) the asphyxial group contacted the Complex stimulus significantly more frequently than they did the Intermediate stimulus; and (b) the normal group confined its locomotion to the outer sector of the field significantly more often in the Empty condition than in the Complex condition. No other intra-group comparisons between the four stimulus conditions were statistically significant.

Locomotion, contact, and emotionality scores in the first four days of observation were not significantly different from scores in the last four days of observation; thus, no satiation effect was apparent over sessions in either group.

2. *Inter-Group Comparisons*

Inter-group differences have been summarized in Table 1.

Locomotion scores showed no statistically significant differences between

¹ This was based on a suggestion by Stephen Bernstein, Primate Laboratory, University of Wisconsin.

groups, although the asphyxial animals' scores were consistently higher than those of the normal animals in all four stimulus conditions. Normal subjects, though, confined their locomotion significantly (5 per cent level) to the peripheral or outer sector of the field in all except the Complex condition.

TABLE 1
NORMAL (N) GROUP AND ASPHYXIAL (A) GROUP AVERAGE SCORES
IN THE FOUR STIMULUS SITUATIONS

	Simple	Inter- mediate	Complex	Empty
Locomotion	N 7.0 A 7.4	N 6.8 A 8.1	N 7.0 A 8.2	N 6.6 A 7.3
Locomotion outer sector	N 4.5 A 2.5*	N 4.8 A 2.7*	N 3.4 A 3.0	N 5.1 A 2.4*
Contact stimulus	N 1.4 A .6	N 1.2 A .2	N 2.2 A .8	
Orient toward stimulus	N 6.9 A 3.5*	N 6.8 A 3.4	N 6.9 A 3.9	
Emotionality	N 5.9 A .2*	N 6.6 A .4*	N 5.2 A .3*	N 7.2 A .5**

* Significant at the .05 level.

** Significant at the .01 level.

When the Complex stimulus was present, all members of the normal group ventured into the middle and inner portions of the field more frequently than in the other three conditions. Asphyxial group locomotion, however, was not significantly confined to any particular part of the field, but instead was distributed throughout the entire available area in all four stimulus conditions.

The two groups did not differ significantly in number of stimulus contacts, although in all conditions the normal animals contacted the stimuli more frequently than did the members of the asphyxial group. In addition, the normal group oriented toward the stimulus more frequently in each condition than did the asphyxial group, and in the Simple condition the differences were significant at the 5 per cent level.

The composite emotionality score showed greater emotionality in the normal group as compared to the asphyxial group. Differences were significant at the 5 per cent level in the Simple and Intermediate conditions, and at the 1 per cent level in the Complex and Empty conditions. An analysis of the emotionality scores revealed that sucking was the most frequent emotional behavior observed, and rocking the next most frequent. Since sucking also occurs in the home cage to some extent and may therefore be questionable

as an emotional behavior, scores were re-computed with all observations of sucking excluded. The emotionality of the normal group was still found to be highly significant when compared with that of the asphyxial group.

D. DISCUSSION

In a previous experiment (2), asphyxial monkeys locomoted significantly more, initially contacted stimulus objects more, and were significantly less emotional than were normal control monkeys. It was presumed that further exposure to the open-field situation, thereby providing additional adaptation to the observational environment, would tend to decrease or even possibly eliminate these differences between groups.

Results of the present investigation proved the presumption to be only partially correct. Data from the 32 three minute observational sessions of the present experiment showed that significant differences between groups in locomotion no longer existed, although locomotion scores of asphyxial subjects were still consistently higher than were those of the normal group. Normal subjects did not locomote freely throughout the entire field as did asphyxial subjects, but instead their locomotion was primarily confined to the periphery of the field. Such restriction of locomotion in the normal animals most likely also reflects the greater emotionality of this group as compared to that of the asphyxial group.

Contact scores were, on the other hand, consistently higher in the normal group than in the asphyxial group, but the differences were not significant statistically. This finding substantiates the trend noted in the terminal observational sessions of the previous experiment (in which normal animals had begun to contact the stimuli more frequently than did the asphyxial animals), and probably can be explained by the additional adaptation to the observational situation afforded by the 32 exposures of the present study.

Contrary to presumption, however, emotionality scores continued to show definite differences between groups. In all four stimulus conditions, the normal animals were significantly more emotional than were the asphyxial animals. Analysis of the composite emotionality score demonstrated that although sucking was the most commonly observed emotional behavior, differences between groups were significant even when this behavior was excluded from the total emotionality score. All members of the normal group showed several of the behaviors defined as indicative of emotionality, rather than merely a high frequency of occurrence of one, such as sucking. This was also true of the asphyxial group in that no one emotional behavior was characteristic of any one animal or of either group as a whole.

Locomotion, contact, and emotionality scores of neither group differed radically as a function of the particular stimulus condition presented. The Complex stimulus attracted somewhat more attention and interest than did the other three stimulus conditions of the experiment, but in general, within both groups behavioral patterns remained essentially the same irrespective of the stimulus condition. Thus, the Simple, Intermediate, Complex, and Empty conditions did not exert highly significant differential effects on observed behavior in this experimental situation. For all four conditions it was found that: (a) normal animals locomoted slightly less than did asphyxial animals and their locomotion was predominantly confined to the outer squares or peripheral part of the observation room; (b) normal animals contacted the stimulus more often than did the asphyxial animals and oriented toward it more frequently; (c) normal animals remained significantly more emotional than asphyxial subjects in spite of their relatively high level of exploratory activity.

The activity most characteristic of the asphyxial group appeared to be random or undirected locomotion not particularly influenced by the environment, whereas that of the normal animals seemed to be much more directed and controlled by their immediate surroundings.

E. SUMMARY

Observations of young monkeys subjected to asphyxia neonatorum and normal control monkeys under four different stimulus situations showed consistent and significantly greater emotionality in the normal group as compared to that of the asphyxial group. No significant differences existed between groups in frequency of locomotion or in stimulus contact scores. Normal animals, however, generally appeared to be more responsive and more reactive to immediate environment than were asphyxial animals.

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TOWARD A CLOSER ALLIANCE BETWEEN PSYCHO- ANALYTIC AND GENETIC SCHOOLS OF PSYCHOLOGY*

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LUCILLE HOLLANDER BLUM AND MAX GELLER

A. INTRODUCTION

Review of the history of investigation in child development shows a shift in somewhat recent years. Earlier, the emphasis was in the direction of attempt to determine developmental sequence, as for example, in language, and to explore the relative roles of processes such as motivation and learning and of factors such as heredity and environment. More recently the interest has been the influence of early childhood experiences upon the adult personality.

With the change in focus, research workers in child development have of necessity borrowed from the psychoanalytic schools. Baldwin (2), in speaking of current research trends, points up that the science of a child development is in fact largely living off the hypotheses coming from psychoanalysis.

In the psychoanalytic field on the other hand, questions of genetic nature have been raised from the time of Freud's first exploration of the unconscious. For example, genetic aspects in psychopathology are indicated in Freud's (6) questions concerning the infantile themes in his patients' fantasies and dreams. More recently, questions have been raised somewhat more directly. Ackerman (1), for example, in his discussion of the child and family psychopathy states, "The heart of the matter is how and by what processes does the growing child internalize significant psychic content of its family environment."

What seems to become more and more apparent from the point of view of each of the fields is the need for synthesis between them, i.e., to combine psychological facts with clinical ones, and to form some linkage between the psychopathology of the adult and psychologic development of the normal child.

Odier (8) who has attempted an integration of psychoanalytic concepts with the findings of genetic psychology points up the dichotomy between the analytic and genetic schools. He states, "psychoanalysts have somewhat neg-

* Received in the Editorial Office on February 11, 1960.

lected the study of the laws of thought and intelligence and the evolving modes of the formation of the mind. The genetic psychologists have neglected the characteristics of affectivity with its origins and functionings." The genetic psychologists, Odier (8) indicates, have treated instincts and emotions comparable to poor relatives, while the analysts have given the affects overwhelming attention. Odier (8) states in fact, that every psychology that wishes to be clinical and analytic must also be genetic.

B. RELATIONSHIP BETWEEN INTELLECTUAL AND AFFECTIVE ASPECTS OF DEVELOPMENT

The present paper is an attempt to explore in a limited way, the possibilities of throwing some bridges across the river in order to join the intellectual and affective banks, to use Odier's (8) metaphor. The emphasis in general is in regard to perception.

Two earlier papers (3, 4) have attempted to show the influence of psychopathy upon the individual's perception of the world and of himself. Through the data which consisted primarily of material from psychotherapeutic sessions, the role of anxiety in restricting and distorting perception was pointed up.

The more recent paper (4) was a report of a woman whose complaints were anxiety and sterility. Attempt was made to show that because of her early experiences in relation to her mother she continued in adult life to perceive herself as a child and to perceive her mother as a threatening figure in authority.

Freudian psychology through its focus on adult neuroses indicates, of course, the fact that intellectual and affective development do not always proceed simultaneously. From the genetic point of view, Piaget's (9, 10) contributions have contributed conspicuously to our understanding of early psychic activities and their developmental progress.

Piaget (9, 10) classifies the first stages in the development of mental operations as "prelogic" and differentiated from later stages where there is the acquisition of logical, conceptual and formal thinking. In infantile or prelogic thinking the individual interprets reality according to the emotions he experiences. Objective judgments become inaccessible to him. Projection, introjection, and imitation occur in the child—and as the clinician can confirm—in adult neuroses. A further characteristic of the prelogic stage is magic thinking which is intimately related to projection. Conspicuous in the infantile thinking of the patient referred to above, was the magic which

she employed in her relationships to her mother and other women whom she perceived as malevolent powers.

Odier (8) in discussing anxiety and magic thinking, points up that magic thinking seems to be associated with the early fears of the child. Magic thinking serves as a protection and also at times as an action of destruction. "In the small child, helplessness and insecurity are usually the causes of anxiety. This is normal for the child and it is normal for him to resort to magic thinking when confronted with danger." In the adult, magic thinking is a "mental regression" in which rational and conceptual thinking are relinquished for prelogical thinking.

C. DREAMS AND PRELOGIC THOUGHT PROCESSES

Odier (8), in his attention to the dreams of patients in psychoanalysis raised questions such as the following: Is there a real relationship between the dream mechanisms of the neurotic adult and the mechanisms of infantile prelogic? If there is, to what does the relationship owe its existence and what are its characteristics?

In his answers which affirm an existing relationship in regard to the aforementioned, Odier (8) focuses on Piaget's work reporting the developmental stages of the child's mental activities. More specifically Odier (8) points up Piaget's concept of primary or infantile "realism" which describes the young child's inability to distinguish between himself and the outside world. The child attributes his own psychic qualities to objects and to people and accepts the attributed qualities as real. For example, perception is attributed to the perceived, thought to what is thought.

Thus Odier (8) points up that sleep in inhibiting the objective perception of things, also inhibits the more evolved modes of thinking. Sleep allows a purely subjective perception of phenomena and consequently re-establishes primitive intellectual modes of thinking. In that the dream recognizes the law of infantile realism, it is perhaps the best observable phenomenon capable of realizing agreement between adult consciousness and prelogic thought. This accord means that the ego and unconscious thoughts join again on the prelogical level.

Coupled with the characteristics of prelogical thought represented in the dream, are the affects described by Freud (6), which relate to, and animate the thought.

The primitive intellectual mode of thinking occurring in dreams is indicated by Fenichel (5). He states: "Another strange characteristic of archaic thinking is represented by symbolism The use of symbols is

a falling back into an earlier primary stage of thinking, by means of which intended distortions are brought about. In dreams, symbols appear in both aspects, as a tool of the dream censorship and also as a characteristic of archaic pictorial thinking, as a part of visualizing abstract thoughts."

Freud (6) too, in addressing himself to the content of dreams in terms of present and past, points up the following: "1 . . . the dream clearly prefers the impressions of the first few days . . . 2 . . . it makes a selection in accordance with principles other than of those governing waking memory, in that it recalls not essential and important, but subordinate and disregarded things. 3 . . . it has at its disposal the earliest impressions of our childhood, and brings to light details from this period of life, which again, seem trivial to us, and which in waking life were believed to have been long since forgotten."

Among current authorities in the field of dream analysis, Gutheil (7) stresses the timelessness in dreams. "They (the dreams) reflect the dreamer's unique personality and derive their meaning from the individual's specific past and present conflict situations."

Wolberg (12), in an extensive description of what the dream embraces, includes the following: "1. Early memories or experiences, perhaps long forgotten, that have made a significant imprint on the person. 2. Attitudes and fantasies in relation to parental agencies and siblings. 3. Defenses that were elaborated against early experiences, conditionings and fantasies . . ."

D. THE MOTHER-CHILD RELATIONSHIP AND THE DEVELOPMENT OF PERCEPTION

Investigators of personality development differ in their opinions in regard to the effects of different approaches on the part of the mother to her child. They appear to agree, however, that the mother is the child's most important source of love and security, especially during his early years.

Sullivan (11) describes the infant's tendency to empathize and respond to the mother's emotional state. For example, if the mother is relaxed, so is the infant; if the mother is upset while feeding her infant, he will experience feeding difficulty. Sullivan (11) refers to the infant's empathy as "the peculiar emotional linkage that subtends the relationship of the infant with other significant people." With the development of perception, the child begins to perceive on the basis of his past and current experiences in his small world of family and home.

The data presented below attempt to indicate how aspects of the child's early experiences and perceptions continue into adult years as part of the

individual's personality. The material is in connection with two people who were in psychotherapy. Discussion in regard to each individual is concerned largely with what appeared as possibly the most significant factor in the mother-child relationship to have influenced development of the child's perception, and to have contributed to his difficulties in relationships.

In considering the data we have attempted to show the conspicuous thread, from the point of view of the individual's perception, which runs through his life. Thus, we hope to demonstrate how prelogical thinking with its infantile characteristic persisted beyond its normal phase of development, and, how for the individuals described, prelogical thinking was used in the present—as in the past—in the service of their affective lives.

The Case of A.T.; 35-year-old male

A.T. is an only child. His parents were divorced when he was five years old. A.T. remained under the care of his mother. His father remarried but visited him regularly.

A.T. has an M.D. and Ph.D. degrees. His field of specialization is biochemistry and he holds a position in an institute engaged in medical research.

A.T.'s communications in therapy and his projective test material indicate a problem with men, both authority figures and contemporaries. It seems, however, that his exceedingly strong drive toward achievement has helped him to work with competency so that on his job he has been given increasing responsibilities and has gained status advancement.

In contrast to the success which A.T. has achieved educationally and professionally, his difficulties have isolated him socially. This is the case particularly in regard to women. In fact, his initial and chief complaint to the therapist was his lack of confidence in relation to women, and his feeling that they saw him as unacceptable. Especially in the early period of therapy, he would frequently describe the intense and painful loneliness which he experienced.

A.T. described his mother as capable and efficient. She was an excellent cook and housekeeper. She held a secretarial position and employed a helper to look after the child during the time she worked.

According to A.T. his mother could not stand to see her house or child dirty and kept both in very clean order. She was not affectionate. In fact A.T. recalls his mother repulsing his attempts as a child to hug or kiss her. She rigidly adhered to a fixed schedule in her day-to-day care of A.T. and later boasted her accomplishments in regard to feeding and early toilet training.

She continually pointed up the differences between right and wrong and responded to the child's "transgressions" with physical punishment. For example, A.T. recalled his mother tying his fingers together after several occasions of his having opened a chest drawer.

In line with curbing the child's spontaneity and initiative, she instructed him in gentlemanly manners—how to walk and how to sit—and warned him that people would dislike him if he misbehaved.

Contributing to A.T.'s perception of his mother as disapproving and rejecting was her actual statement that she did not want a child. She said, "It was your father's idea."

In therapy, A.T. described his mother as cold and with "strength" of character. He felt some little approach to softness on her part only when he was sick. At such times she would sit at his bedside and read stories to him.

Piaget (9, 10) has pointed out that a characteristic of the prelogic stage in development is the tendency on the part of the child to divide the world of reality into the "good" and the "bad." Whoever reassures and protects the child is good, and is liked by the child. In turn, the child feels liked. Whoever threatens and frightens the child is wicked and disliked. In turn, the child feels disliked. That is to say, the child's first concept of the world is that he is endlessly the object of the benevolent or malevolent thoughts and actions of others.

The case material in regard to A.T. certainly seems to suggest that as a child, he developed a perception of his mother as a malevolent being. This in fact tends to be supported by the Rorschach report submitted by the psychologist who tested A.T. shortly after the start of therapy. The Rorschach material indicates that A.T. saw his mother as cold and giving very little support and affection. The report continues, "On the one hand, they (female figures) are rejected because they are perceived as exploiting and demanding affection for their own narcissistic needs; on the other hand they are put on a pedestal of virtue which makes them further inaccessible."

Conspicuous in A.T.'s perception of his mother as malevolent was the anticipation of bodily harm from her. The threat of being hurt physically was related to the perception of himself as deficient, weak, and helpless. In addition, he saw himself as lacking masculinity—effeminate looking.

And, as the material obtained in connection with A.T.'s therapy indicated, all of the aforementioned characteristics in A.T.'s perception of himself tended to persist in the adult years. The Rorschach report for example states, "Sexual identification is somewhat confused and indicative of passivity and femininity." Passivity and the need to comply figured significantly in A.T.'s relationship to the therapist whom he saw as a powerful woman in authority. Especially in the early phases of therapy, A.T. would communicate anxiety and apprehension in every instance where he considered his behavior assertive. He further saw the therapist as cold, "with a smile at times which is a sneer." He communicated frightened feelings in relation to her and described fantasies of her—as well as women to whom he had begun to relate socially—in which anger was expressed toward him with physical violence. During one session, for example, he described a fantasy of the therapist hitting him with her fist when his head was turned away from her. In telling such fantasies

he would attempt to defend the irrational thoughts and feelings with comments as, "I know this is ridiculous. I am stronger physically," and "I know that you wouldn't bite." Yet he regarded himself, especially early in therapy, as a child and he responded as if the therapist also perceived him as such. Thus, for example, on the few occasions when he came to his session some minutes late, he was very apprehensive in anticipation of the therapist's impatience and anger. Expectation of harm from the therapist in one way or another was communicated by A.T. when he began to take steps toward heterosexual relationships. He said that during his adolescence his mother had voiced strong disapproval at boys' behavior such as "making passes at girls."

The case of C.W.; 17-year-old female

C.W. is a 17-year-old girl, the third of four siblings. She lives at home and attends high school.

Her parents reported the following: She had been showing increasing unwillingness to attend high school and her academic work had been deteriorating, although she had superior intelligence. C.W. complained that she was tired of everything. At the same time, she engaged in hysterical outbursts against her parents, and refused to listen to them. She also engaged in various forms of self-destructive behavior, such as taking more than a safe dosage of sleeping pills, speeding in a car and refusing to eat.

Projective test as well as therapeutic data revealed an exceedingly bright and sensitive adolescent. C.W. seemed caught poignantly between the urge to grow into adulthood and the need to cling childishly to her family, particularly the mother, through submission and rebellion. The projective tests found that her "verbal retreat from life as meaningless, ridiculous, deceptive, and hypocritical reflect both the simultaneous wish and fear of acting out."

In the early phase of therapy, C.W. readily expressed her hopeless feelings about how things were going for her. She saw nothing good for herself in the future. She felt that school was useless and found less and less in common with her friends. She further complained of her parents' failure to understand her. At the same time, she would also give expression to some need to satisfy her family's requirements of her.

Slowly, elements of her conflictful feelings toward her family, particularly her mother, began to emerge. She described her mother as the dominant figure in the household. "She sort of reigns over us. Father doesn't take the upper hand with us—she does." When C.W. was "quite small" her mother became ill. During the period of her mother's illness, C.W. hated the housekeeper who would not permit the child to go into her mother's room. C.W. had a been a blue baby. She said, "They didn't know if I was going to live." And through the years, whenever she was ill, her mother gave her almost constant care. To this day, she feels at times that she has to tell her mother everything. Again at other times, she feels that she does not want to tell her mother anything. In

so far as therapy, in the beginning she would detail the sessions for her on the way home. C.W. said of her mother, "She keeps on expecting things from me."

The controlling and constricting aspects of the mother were further highlighted by the fact that C.W. found her so endowed with generally superior qualities. C.W. described her mother as a "lovely, outgoing" person who has a great number of friends. C.W. reported that her mother belonged to many community organizations, with leadership in some of them. She added, "I don't think there's a person who dislikes her."

As therapy progressed, C.W. gave increasing expression of resentment of her mother's restricting qualities. C.W. also complained of her mother's bad temper. She said, "I don't have the freedom I should have at my age." It might be added that expressions of guilt and/or dependency needs, usually followed C.W.'s communications of complaint and criticism of her mother.

The mother's dominant role in the household seemed relevant to C.W.'s sharp disappointment and disillusionment vis-à-vis her father. She would describe him as having let her down. He would break promises made to her, and bother her with all kinds of questions and admonitions.

Understandably, C.W.'s relationship to the therapist went through several stages. Initially, she was quite suspicious as to his motives for treating her. She believed he was acting in behalf of her parents. As she began to realize that this was not so, she expressed satisfaction over the fact that interest was focused on her own needs. However, there was ambivalence. She sought to enlist the therapist as an ally—particularly against the mother. On the other hand, there remained the need to tell her mother about the content of the sessions. As C.W. improved in her relationship to the therapist, she evidenced an increasing uneasiness. This was expressed in part by a need to please the therapist as well as to resent the authority she gave him.

The categories below have been designed to illustrate more systematically than the historical and therapeutic data the persistence of the perceptual patterns in the life of the individual. In order to suggest a possible bridge between analytic and developmental approaches to human behavior the categories include the individuals' affect (emotions) and impulses or drives. It should be added that these categories, as well as the rest of the data are only suggestive of a possible approach.

E. RECAPITULATION

The intent of the paper is to indicate that in any approach to personality there is a need to consider psychological as well as clinical factors. Thus, the paper points up the importance of integration between psychoanalytic concepts and the findings of genetic psychology. In a more specific way,

TABLE 1

Dream material (Verbatim)	Percept of maternal figures	Self-percept	Feeling-tone affect	Impulse or drive
<i>Patient A.T.</i> I was driving with Beth, stopped at a house. I sat next to a lamb with fur— comparable to a ready-made blanket.	Comforting	Small	.	Toward nurturance
I had my hand on its nozzle for warmth. It turned to a black cat—very ferocious— not friendly—it wanted to bite me. I held its head to keep it from biting—dared not let it go.	Threatening (warmth potentially dangerous)	Helpless vulnerable	Frightened	Toward protection (avoiding danger) Toward protection (holding on)
**** About therapy and (woman) therapist. Don't know if I came late. A lot of interrup- tions. Someone knocked. You said, "Stay there." You cov- ered me with a blanket. A man came to adjust audio equipment. I wanted to watch You said, "It's time to go." Another interruption. You asked me to wait outside.	Rejecting	Small	Helpless	Toward acceptance
	Overprotecting unpredictable	Dominated	Uncertain of acceptance	Curiosity— toward exploration
**** I was teaching. There were several women in the class. One woman had a doll in her arms. I asked her if it was a doll. She said, "No, just a doll. I'm expecting a baby." I looked to see if she was pregnant. Couldn't tell. Chairs were in the way.	Untrustworthy rejecting	Authoritative childlike	Frustrated inadequate	Toward exploration (obstacles in way)

TABLE 1 (continued)

Dream material (Verbatim)	Percept of maternal figures	Self-percept	Feeling-tone affect	Impulse or drive
<i>Patient C.W.</i>				
Dreary long harsh winter.	Confining restricting	Bound	Depressed	Toward withdrawal
Woke and heard birds joyful.				
Birds ugly and fat	Overprotecting (discouraging growth)	Small—helpless ugly		
They'll grow up to be beautiful.		Potentially grown up and attractive	Hopeful	Toward growth and gregariousness
Felt alive—as if I'd been dead.				
It's all coming back.				

Someone was fighting with me, but I did not argue back. I saw Mother and Father.	Dominating quarreling repressing	Helpless (<i>response to threat</i>) complaint	Helpless frustrated depressed	Toward submission
I laughed—it brought down the tension.			Hopeful	Toward exploration
The fog was lifting—they stopped yelling.				
I was building some sort of castle with wooden blocks. I kept saying: "I'm going to give up—I'm tired." Yet I tried.	Discouraging growth overprotecting frustrating	Small and helpless inadequate	Helpless depressed	Toward support (environmental)
I didn't get anywhere.				Toward growth
But I was thinking that it's the little things that build and become big things.		Potential ability for growth	Frustrated Hopeful	

the paper is concerned with perception and its role in interpersonal relationships.

Piaget's work on the developmental stages in the child's mental activities is considered. Attempt is made to show that characteristics of prelogic thinking, described by Piaget as the first stages in the development of psychic operations, also occur in the disturbed adult.

Material is presented in relation to two individuals who were in psychotherapy. The data are considered primarily from the points of view of the mother-child relationship and factors in the relationship which seemed to have influenced conspicuously the individual's perceptual development.

The paper attempts to indicate how, because of early life experiences, early mental activities with their infantile characteristics may continue into the adult life of the individual. Categories were developed from the data to illustrate the similarities between early and later perceptual responses of the individuals under discussion. In the development of the categories, the individuals' dreams were also taken into account.

The writers recognize the oversimplification in regard to the material which they have presented. However, the purpose of the presentation is primarily to suggest a more integrated approach to ego dysfunction than seems at times to be practiced.

Again, it seems that disturbed and unrealistic affect and behavior in the adult may be regarded as anachronistic, i.e., as hangovers from earlier life periods. It would seem then that the perceptions, now distorted, were at one time the child's appropriate responses to the then existing conditions. It should be added however that there are important differences between the prelogical character of the child's psychic activity and that of the disturbed adult. The term "paralogic" has, in fact, been suggested to differentiate the regression of the so-called neurotic adult from the prelogic of the child. The perceptual distortions inherent in the anachronisms are based on the fact that conditions have changed for the individual who is now an adult. In the adult there is the need for perceptions which are different and in conformity with his present reality.

The paper further tends to remind us of differences in rates of development. The case of A. T., which has been described, shows conspicuously that some aspects of an individual's behavior and affect may be still quite infantile while other aspects of his personality may have developed to high levels of maturity.

Perhaps most significant in an analytic approach to personality which takes into account developmental psychology is that there then tends to be less

emphasis on pathology and diagnostic labelling than is so frequently an occurrence today.

Notwithstanding the limitations of the paper, it includes a number of somewhat important implications. Developmental as well as psychoanalytic data must be studied in order for the worker to have a clearer understanding of the present distortions and the consequent discomfort on the part of the individual who comes for help.

In addition, this integrated approach would lend itself to a more precise examination of capacity for growth as well as examination of aspects of development which have lagged.

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EFFECTS OF AGE AND STIMULUS CHARACTERISTICS ON MANIPULATORY RESPONSIVENESS OF MONKEYS RAISED IN A RESTRICTED ENVIRONMENT*¹

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A. INTRODUCTION

The present experiment investigated the development of manipulatory responsiveness and its relation to stimulus characteristics in rhesus monkeys. The animals were maintained and tested during the period from birth to 90 days of age in enclosed isolation cages which provided a restricted and relatively constant visual environment, affording few opportunities for manipulation and visual investigation beyond those presented by the experimental conditions.

B. SUBJECTS

The Ss were two rhesus monkeys, separated from their mothers within 12 hours of birth and housed individually in the isolation cages subsequently described. Feeding schedules were varied in accordance with the changing needs of the Ss, but throughout the period covered by this research the monkeys were maintained on milk formula presented in a stainless steel tube equipped with a rubber nipple. For feeding, the tube was inserted through a small opening above a conical, hardware cloth feeding rack, secured to the floor at the center of the living cage. During the first three days of life, arm-length mittens were attached to the side of the cage and these were used to place the S on the feeding rack and to guide it to the nipple. No other aspect of E or the extra-cage environment was visible to the S during these feeding placements and they were discontinued on the third day.

C. APPARATUS

The isolation cage, shown in Figure 1, included a living space 24 inches by 18 inches by 15 inches and two stimulus presentation compartments, 12 inches by 18 inches by 15 inches, one at each end of the living space. The ceilings of these compartments were constructed of translucent white Plexi-

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glas and illumination of the interior of the compartments and of the living space was provided by two 25 w. bulbs, one placed above each compartment. Access to the stimulus presentation compartment from the living space was through five horizontal bars .25 of an inch in diameter and 2 inches apart, center to center. Sliding opaque screens could be interposed between the living space and the presentation compartments. At the rear of each compartment there was a second opaque sliding screen with a small one-way observation aperture. Ventilation was provided by a blower, which also served as a masking noise. The entire apparatus was painted aluminum.

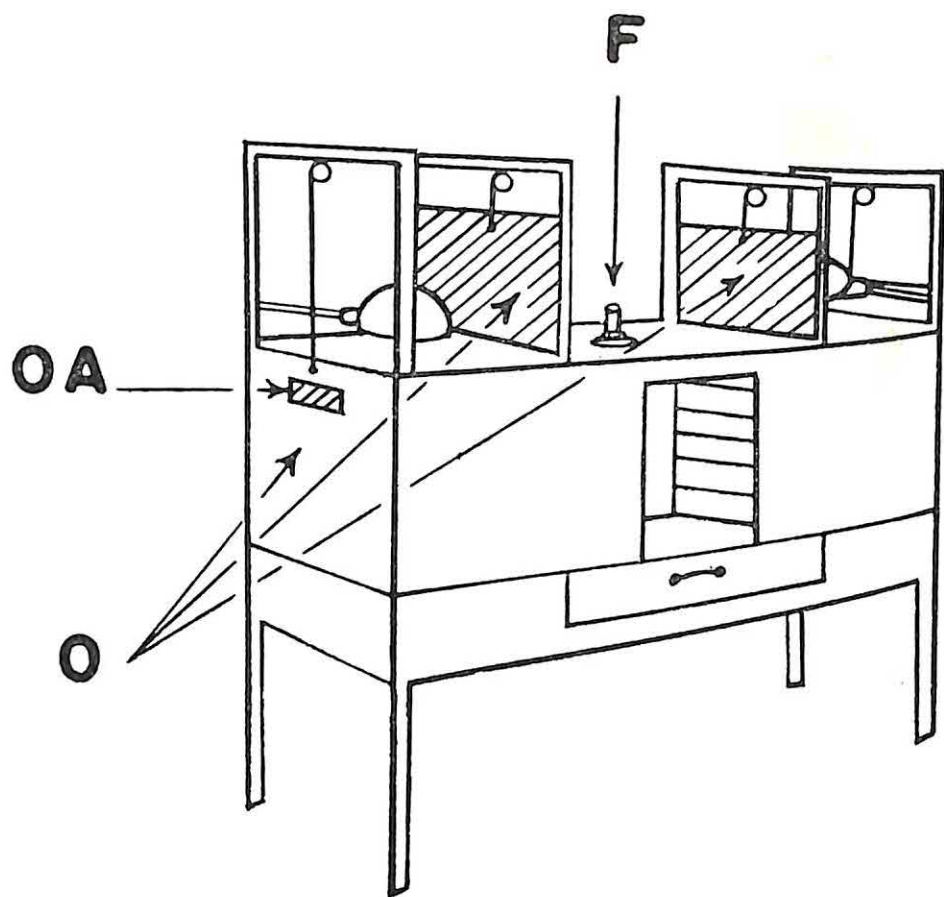


FIGURE 1

SCHEMATIC DRAWING OF THE ISOLATION CAGE. OA, OBSERVATION APERTURE; O, OPAQUE SCREENS; F, OPENING AND HOLDER FOR FEEDING TUBE. AN OPAQUE DOOR COVERED THE OPENING AT THE SIDE OF THE CAGE, WHEN THE CAGE WAS OCCUPIED

D. PROCEDURE

Manipulatory responsiveness was tested continuously during the first 90 days of life. Three classes of stimuli were used, each class represented by two stimulus objects: *Movable*. A brass rectangle 1.75 inches by 1 inch by 1 inch, and a T constructed of .25 of an inch steel rod, with 2.5 stem and arms 1.25 inches. These stimuli were mounted on springs and could be moved around a fixed base. *Flashing*. A shield of orange plastic, 2.75 inches by 1.5 inches by 1.25 inches and a shield of green plastic 3.25 inches by 1.25 inches

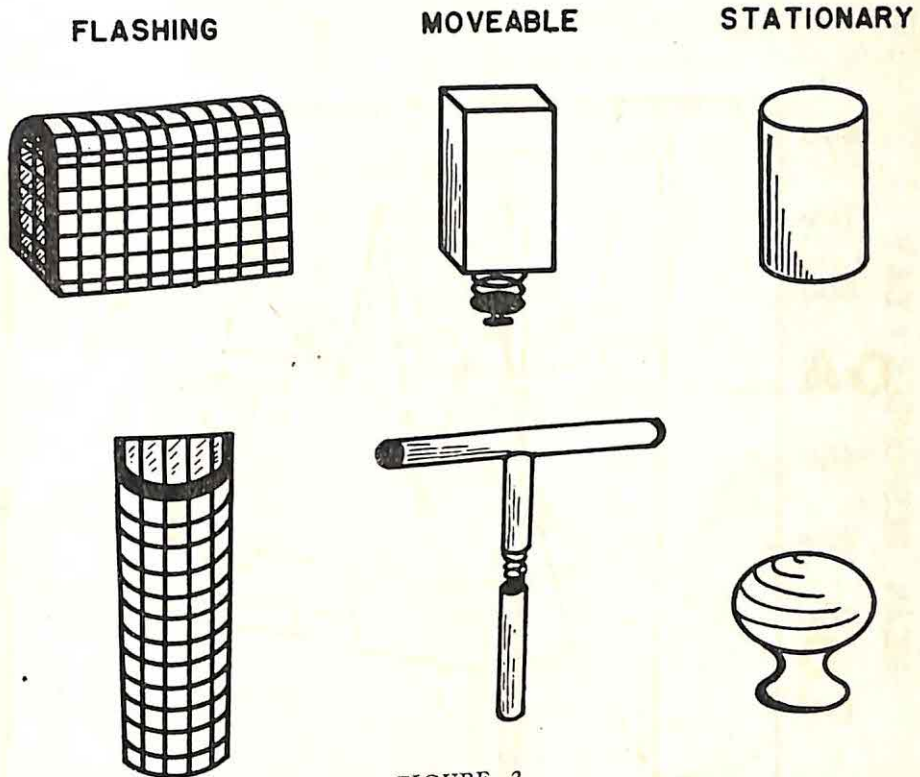


FIGURE 2
STIMULUS OBJECTS

by 1.25 inches. Each shield was covered with hardware cloth and enclosed a 6 w. bulb that flashed once per second. *Stationary*. An aluminum cylinder 1.5 inches by 1 inch and a brass knob 1.37 inches by 1.25 inches. The stimuli are shown in Figure 2.

Beginning on the first day of life a single stimulus was presented continuously for five successive days, appearing three days in one compartment and

two days in the other. On the sixth day this stimulus was removed and a new stimulus was introduced. This continued for six successive 5-day periods until all stimuli had been presented. The sequence was then repeated until each stimulus had been presented on three 5-day periods, each period separated by 30 days. The following sequences were observed: *S* No. 19, knob, green light, cylinder, T, orange light, rectangle; *S* No. 20, T, rectangle, knob, green light, cylinder, orange light.

The appropriate stimulus was mounted at the center of the presentation compartment, two inches in front of the grille. Each discrete stimulus contact by the *S* completed an electrical circuit, activating a Veeder-Root counter.² At the same time each morning the opaque screens in front of the grilles

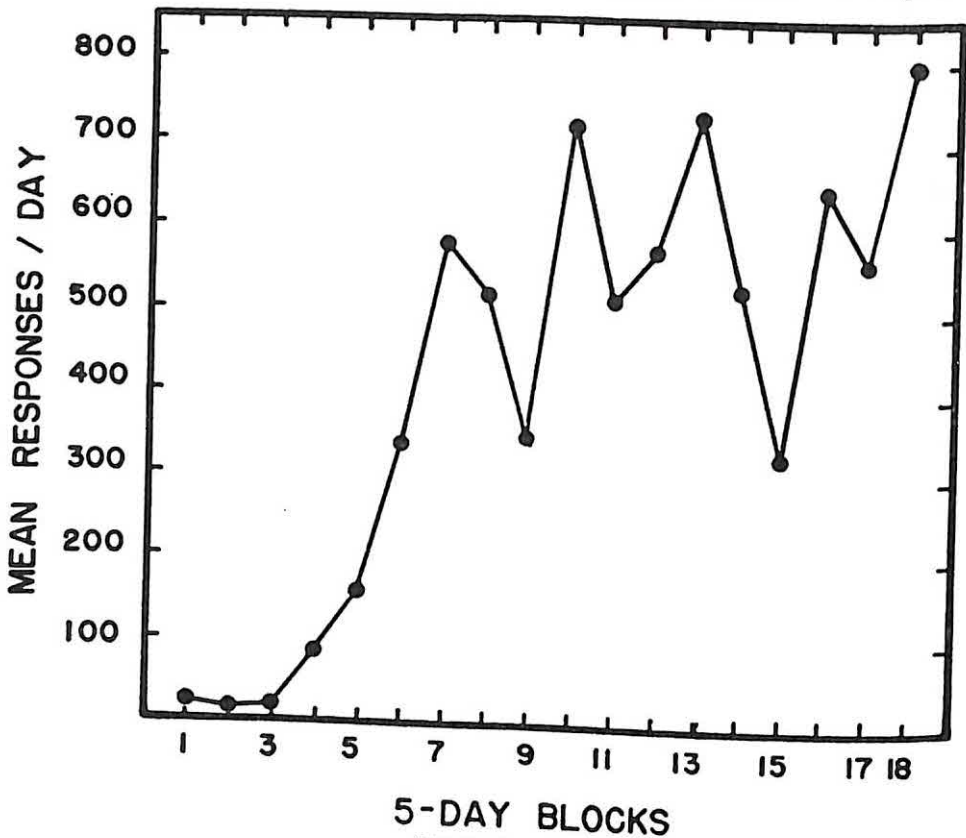


FIGURE 3
MEAN DAILY RESPONSES IN FIVE-DAY BLOCKS

² I am indebted to Dr. K. U. Smith and Dr. L. B. Wyckoff, Jr., for advice in the construction of the recording apparatus.

were lowered for five minutes. During this time the number of contacts occurring during the preceding 24 hours was recorded, and in accordance with the experimental schedule, the stimulus object was changed from one compartment to the other, or a new stimulus object was introduced.

E. RESULTS

The development of manipulatory responsiveness is shown in Figure 3. Each point represents mean daily contacts during a 5-day test period. Contacts were recorded for both *Ss* by the second day of life, but response frequencies were generally low throughout the first 15 days, and for neither *S* did daily totals exceed 150 during this period. During the next 20 days responsiveness increased rapidly and progressively. Subsequent performance levels, although high, provide little indication that the steady upward trend displayed during the first 35 days of life was maintained. Total responses for successive 5-day periods within the first 30 days were compared with total responses for equivalent periods during each of the subsequent 30-day blocks and the differences were significant at the .01 level as determined by sign tests. Differences between the second and third 30-day blocks were not statistically significant.

Responsiveness tended to be substantially higher on the first day that a stimulus was presented, declined markedly on the second day and showed little change thereafter. This effect, shown in Figure 4, was separately evaluated by the Friedman test (3) for the first, second and third, 30-day blocks and was significant only for the second and third blocks ($p = .05$).

The effect of stimulus characteristics on manipulatory responsiveness is shown in Figure 5. Responsiveness was highest with movable stimuli, next highest with flashing stimuli and lowest for the stationary stimuli. The rapid growth of responsiveness during the first five weeks of life tended to obscure differential stimulus effects, and only data from the last 40 days of the experiment were used to evaluate interstimulus differences. As a further precaution, these comparisons were based on data from adjacent or once-removed 5-day blocks, selected to counterbalance possible differential effects related to age. The differences between the stationary stimuli and each of the other stimulus classes were significant at the .01 level, and the difference between flashing and movable stimuli was not statistically significant, as determined by sign tests.

F. DISCUSSION

The finding that manipulatory responses appear during the first 10-20 days of life in rhesus monkeys and become progressively more frequent during

the next several weeks is consistent with the results of previous researches (2). In the present experiment, however, the visual environment was considerably more restricted than in previous investigations and opportunities for manipulatory activities other than those provided by the experimental conditions were more completely controlled. The present findings indicate,

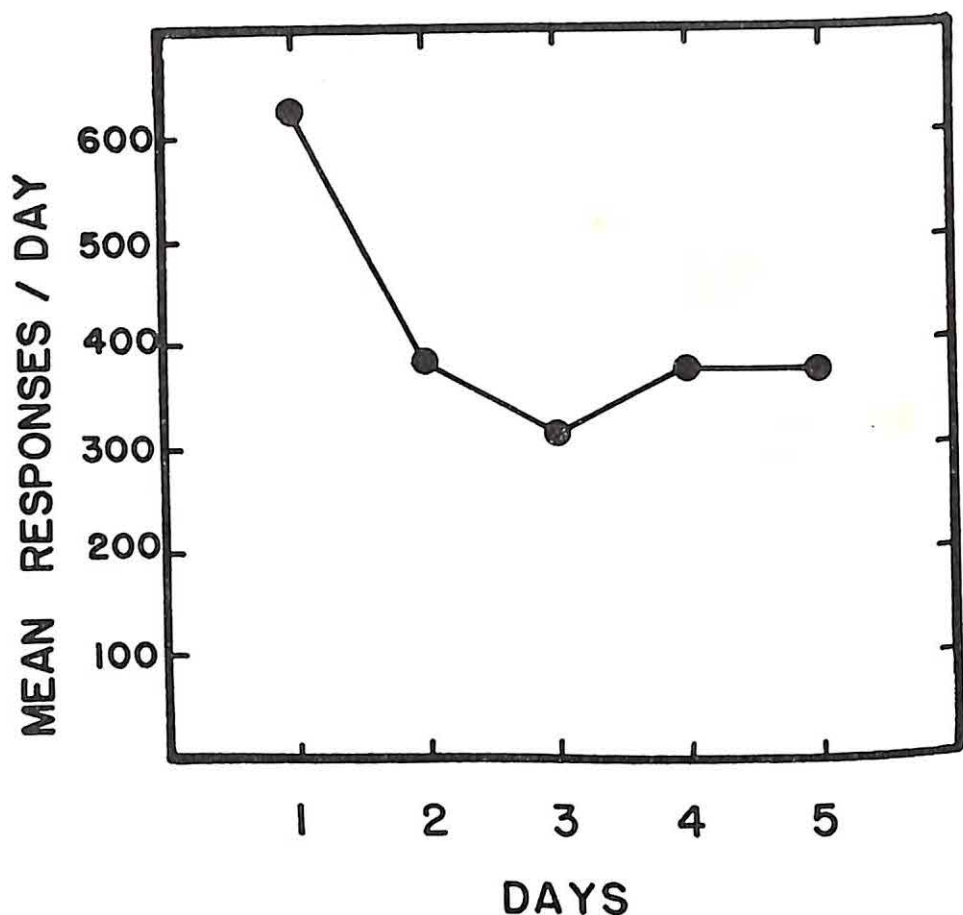


FIGURE 4

MEAN DAILY RESPONSES WITHIN THE FIVE-DAY EXPOSURE PERIOD

however, that the early onset and rapid growth of manipulatory behavior is not noticeably retarded by this reduction in the amount and variety of environmental stimulation. Indeed, the present results suggest that the salient characteristic of manipulatory behavior during the first month of life is its rapid and persistent growth, and this growth process tends to obscure

the effects of other factors, including stimulus characteristics, which can be shown subsequently to influence manipulatory responsiveness.

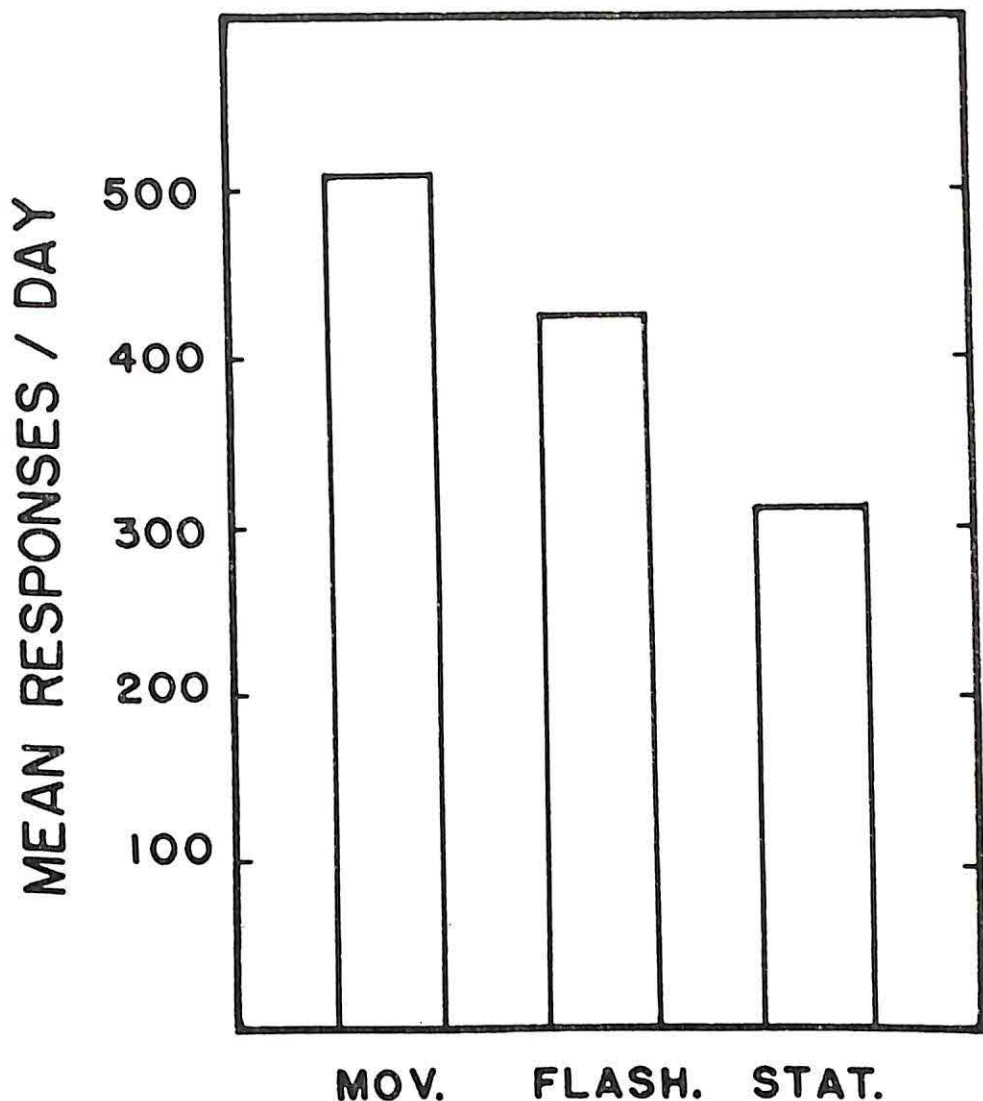


FIGURE 5

MEAN DAILY RESPONSES TO MOVABLE, FLASHING AND STATIONARY STIMULI

The greater effectiveness of the movable and flashing stimuli during the latter phases of the experiment indicates that specific stimulus attributes, particularly those which result in an increase in the amount or variety of

stimulation tend to augment responsiveness, a conclusion which is supported by other studies with young primates (1, 4). The data also indicate that contacts with a stimulus tend to be highest on the first day of a five-day exposure period, offering presumptive evidence of the facilitative effect of novelty upon manipulatory behavior.

G. SUMMARY

1. The development of manipulatory behavior and its relation to stimulus characteristics was investigated in two rhesus monkeys, housed and tested in enclosed isolation cages during the period from birth to 90 days of age. The stimulus objects, each representing one of three classes, movable, flashing, and stationary, were presented singly in successive 5-day periods.

2. Manipulatory responses appeared in both Ss by the second day of life. Response frequencies were generally low, however, during the first 15 days and subsequently increased rapidly and progressively for both Ss.

3. Responses were highest with movable stimuli, next highest with flashing stimuli and lowest with stationary stimuli.

4. The data indicate that responses are generally more frequent on the first day of a 5-day exposure period.

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HISTORICAL CHANGES IN THE FREEDOM WITH WHICH CHILDREN EXPRESS THEMSELVES ON PERSONALITY INVENTORIES*

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A. INTRODUCTION

In a comprehensive review of changes in parent-child relationships over the past twenty-five years, Bronfenbrenner (1958, p. 425) concludes that "... the middle class has shown a shift away from emotional control toward freer expression of affection and greater tolerance of the child's impulses and desires." If this conclusion is tenable, it should follow that middle class children's responses to personality inventories will be freer today than they were 25 years ago. This paper investigates the changes in children's responses to a personality inventory which was first standardized in 1934, and which has demonstrated its continuing usefulness in detecting neuroticism (Brown, 1944).

B. PROCEDURE

1. *Self-Report Inventory*

The Brown Personality Inventory (BPI) (Brown, 1934) was derived from a study of the literature dealing with neuroticism. One hundred seventy-six items were submitted to 1,633 school children between nine and 14 years of age in Cleveland, Columbus, and Dayton, Ohio. Item analysis yielded 80 items which were found to be of highest discriminating power in the detection of neuroticism in children. No relationships were found between the derived neuroticism score and chronological age, IQ, mental age, sex, or socioeconomic status. Subsequent research by Springer (1938) and Brown (1944) showed that there was a relationship between the neuroticism score and socioeconomic status. The inventory yields a total neuroticism score and

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¹ The authors wish to express their appreciation to Mr. Philip Schneider for his assistance in tabulation and analysis of the data for the present study. The writers also wish to thank Mr. Gerald Stucker and Mr. Harlan Lehoma, principals of the Dundee, Michigan and Kenwood Elementary School of Bowling Green, Ohio, for their permission and help in administering the Brown Personality Inventory. We would especially like to thank the fifth and sixth grade teachers of the above two schools for their oral administration of the entire 80 items of the inventory.

five subscores: (1) home, (2) school, (3) physical symptoms, (4) insecurity, and (5) irritability.

In addition to its early standarization on large samples, the parallel validity between the inventory and the Children's Form of the Manifest Anxiety Scale (Castaneda, McCandless, and Palermo, 1956) was found to be high. Pearson *rs* of .91 and .78 were obtained for 131 fifth and sixth grade boys and 131 fifth and sixth grade girls, respectively, all of whom were from a rural consolidated school located in a southeastern Michigan county, of which more than 70 per cent rated lower middle class by Warner's (1949) method. This finding probably has significance with respect to the controversy over whether anxiety scales are measures of neuroticism. With respect to the present study, however, the writers merely wish to indicate that the inventory standardized in 1934 has high parallel validity with a recent personality measure.

2. Subjects

The Brown Personality Inventory was administered to 225 boys and girls in the fifth and sixth grades of a large rural consolidated school in Dundee, Michigan. This particular sample was predominantly lower middle class according to the Warner Scale (1949). The inventory was also administered to 118 children in the same grades of the Kenwood Elementary School in Bowling Green, Ohio. This second sample was predominantly middle class on the Warner Scale.

C. RESULTS

Table 1 contrasts the quintile scores for the sample published in Brown's manual with the two present samples. Brown's failure to publish the original means and standard deviations for his sample makes comparison between the samples difficult. Nevertheless, the results indicate a great increase in scores in each category ranging from 8 to 13 points. Children in the present sample

TABLE 1
COMPARISON OF THE QUINTILE SCORES ON THE BROWN PERSONALITY
INVENTORY FOR FIFTH AND SIXTH GRADE CHILDREN
IN 1934 AND 1959 (TOTAL SCORES)

	Minneapolis, 1934 (N = 576)	Dundee, 1959 (N = 225)	Kenwood, 1959 (N = 118)
Best 20%	0-5	0-13	0-12
Second Best 20%	6-10	14-20	13-17
Middle 20%	11-15	21-27	18-24
Fourth 20%	16-23	28-36	25-28
Lowest 20%	24-up	37-up	29-up

TABLE 2
COMPARISON OF SUBSCALE SCORES ON THE BROWN PERSONALITY INVENTORY FOR
1934 AND 1959

	Home		School		Physical symptoms		Insecurity		Irritability	
	M	SD	M	SD	M	SD	M	SD	M	SD
1934* (N = 665)	2.56	2.44	1.42	1.31	5.31	2.24	4.83	3.67	3.10	1.90
1959 Dundee (N = 225)	4.04	3.00	1.72	1.44	6.51	4.94	5.99	4.20	3.52	2.11
1959 Kenwood (N = 118)	3.23	2.40	1.34	1.25	6.00	4.07	5.06	3.10	3.08	1.90

* These norms are based on 665 cases "selected at random, including children of both sexes and representative of both rural-urban, and high-medium-low socioeconomic status" (Brown, 1934). Though Brown does not identify the ages, the subjects are presumably grades four through nine as in the standardization sample.

respond more frequently in the direction of neuroticism on the items in this inventory. The range of the lowest quintile in the 1934 group (the most neurotic children) falls in the center of the middle quintile for the present samples.

A comparison of the subscores on the Brown Neuroticism Inventory for the three samples is found in Table 2. As can be seen, there tends to be an increase in the categories home, physical symptoms, and insecurity for the present samples, though only the home category is statistically significant ($P < .01$).

In a later study (Brown, 1944), norms are provided for 200 boys in grades four through nine, ranging in ages from nine to 14 years. Table 3 presents the results of a comparison among the three groups on the total neuroticism score. It is evident that there is, again, a marked increase in the over-all scores obtained by the present sample (Brown-Dundee: $t = 10.11$, $P < .01$; Brown-Kenwood: $t = 6.60$, $P < .01$).

TABLE 3
A COMPARISON OF THE TOTAL SCORE (NEUROTICISM)
OBTAINED WITH THE BPI FOR THREE GROUPS

Sample*	Brown, 1944	Dundee, 1959	Kenwood, 1959
N	200	225	118
Mean	13.87	25.29	21.45
SD	9.38	13.24	10.34

* Brown—Grades 4 to 9.

Dundee and Kenwood—Grades 5 and 6.

In the late thirties, Springer (1938) provided scores demonstrating significant differences between socioeconomic groups. Table 4 shows the results of a comparison of the present samples with the scores of the two socioeconomic groups provided by Springer. Whereas Springer's results suggest a significant increase in the neuroticism score for lower socioeconomic groups as compared with middle class groups, the present sample, predominantly middle to low middle class, scores significantly higher than the middle class group he provides.

TABLE 4
A COMPARISON OF NEUROTICISM SCORES ON THE BPI FOR
THREE SAMPLES BY SOCIOECONOMIC STATUS

	Springer		Dundee	Kenwood
	Lower	Middle	Low-middle	Middle
N	327	473	225	118
Mean	22.40	14.60	25.29	21.45
SD	18.65	10.54	13.24	10.35

D. DISCUSSION

Our results show that children today receive much less favorable scores than did children in the 1934 standardization group and the subsequent samples examined during the thirties. Apparently the social and psychological changes since that time have led to changes in children's freedom of expression. What is normal for children today is markedly different from what was formerly the case. It follows that the original norms for this inventory, and probably for others, are of questionable validity.

The changes may be explained in a number of ways. First, they may be taken as the outcome of the greater permissiveness of the modern day middle class parent (Bronfenbrenner, 1958; Klatskin, 1952; Maccoby and Gibbs, 1954), the penetration of psychology into modern life in which the middle class mother is more likely to be exposed to pediatric and psychological advice (Bronfenbrenner, 1958, p. 411), and the greater understanding of teachers (Beilen, 1959). These factors all suggest that our present day society allows greater freedom to children in the recognition of guilt and anxiety. In addition, it has been pointed out by Bennett and Cohen (1959) that the modern adult regards items such as "sincerity," "anxiety," and "nervousness" as central to his own self-concept. It would be surprising if children of this generation of parents were not also open in admitting to guilt and anxiety.

Secondly, it might be maintained that the present day children are actually more neurotic than their predecessors. Sociologists have emphasized the extent to which family stress and disruption of the home unit might contribute to this, and we have noted that the "home" subscale shows the greatest change. However, even if this be the case, the concept of neuroticism needs to be statistically redefined.

Finally, our findings may be interpreted as only one facet of what appears to be a general historical shift in the area of children's personality development. For instance, Jones (1959) demonstrated a convergence of sex roles in children. She found that today's boys were much more like girls in their heterosexual identifications, approval of dating, lipstick, and dancing. In addition, both sexes showed a maturity at the ninth grade which appeared formerly only at the eleventh grade level. Harris (1959) found a greater interest among today's high school students in love, marriage, home, and family. Rosenberg and Sutton-Smith (1960) demonstrated a marked shift in sex role perceptions of children between 1921 and the present. While these results are not directly related to our findings, they do lend support to the notion that there are noticeable differences in the personality attributes of today's children when compared to children of several decades ago.

E. SUMMARY

The results of the present investigation show considerable changes in children's scores on the Brown Personality Inventory between 1934 and 1959, which lends support to Bronfenbrenner's (1958, p. 425) conclusion that "... the middle class has shown a shift away from emotional control toward freer expression of affection and greater tolerance of the child's impulses and desires." Recent research by other investigators (Harris, 1959; Jones, 1959; Rosenberg and Sutton-Smith, 1960) suggests that these findings are only part of a general pattern of historical changes in the area of childhood personality development. These results also suggest the need for a reappraisal of such personality instruments when they are used over long periods of time. Whether the causes for such changes lie in the greater permissiveness toward the admission of guilt and anxiety in modern life, the upward diffusion of lower-class habits, or the increased tension in modern life, the outcome is the same.

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THE SELF-IMAGE IN AGING*

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A. INTRODUCTION

Personality theory as well as empirical clinical observations suggest that the projected self-image or self-concept is a primary manifestation of the individual's motivations, behavior, and level of aspiration. Human figure drawings may be considered as one type of evidence of the individual's self-image.

Dunn (1) has suggested that human figure drawings may be useful for the appraisal of physiological and psychological adjustment. He demonstrated that drawings of the self by children and adolescents, in the age range from five to 20 years, evaluated on a holistic basis, showed a progression in the maturity of representation: from an undifferentiated drawing at age five or six to a well-integrated drawing at age 14 with a leveling off thereafter to the age of 20. Dunn found that the maturity of representation of the drawing not only was positively correlated with age but also with highest grade reached in school, mental age, and adjustment, i.e., normal or deviant (feeble-minded, neurotic, psychotic, and brain-damaged). The drawings of deviants were found to be significantly less mature than those of normals of their own age group.

Lorge, Tuckman, and Dunn (3) have suggested that human figure drawings by adults reflect physiological and psychological deficit that may occur with age. Comparing the drawings of the self by sophisticated younger adults (average age 32) with those by older adults (average age 73), they found that the drawings of the older adults seemed to show a loss in the way the intactness of the human figure was represented. Appraisal of the drawings by two different methods showed sharp age differences: on a holistic basis, the drawings were found significantly less mature for older than for younger adults; by seven criteria, the drawings by older adults were more frequently characterized by incompleteness, lack of integration, more frequently one or two dimensional representations rather than depth, lack of proportion, bizarreness, evidence of inadequate motor coordination, and inability to identify the sex of the respondent. By either method, in contrast to the

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drawings by older adults, those by younger adults were quite homogeneous. The purpose of this paper is to test further the hypothesis that the drawings show increasing loss of intactness with age.

B. METHOD

The drawings of the self by the older adults in the Lorge, Tuckman, and Dunn study were correlated with age, health status, aspects of adjustment, and residence in an institution or not. The sample of older adults consisted of 104 men and women, some of whom were living in a modern institution for the aged and some of whom were individuals participating in two of the recreational day centers for older people in New York City. There were 69 non-institutionalized adults (43 women and 26 men), 55 to 90 years of age; and 35 institutionalized adults (24 women and 11 men) 53 to 89 years of age. For the institutionalized, ratings for functional capacity were available. On admission to the institution, each resident was given a rating from A to D for over-all functional capacity. These ratings, based on careful medical evaluation, take into account the resident's ability to function regardless of disease. Residents with an A rating are permitted to live in an apartment house under institutional auspices; those with a B, C, or D rating are cared for in the institution, in a room, dormitory, or infirmary, respectively. After admission, new ratings were made to reflect changes in the over-all functional capacity of the resident. Since the number of cases was very small, those with an A or a B rating were combined into one group, and those with a C or D rating into another.

For 30 of the 35 institutionalized subjects, there were also available psychiatric evaluations based on interviews with the resident by the psychiatrist, or on consultation with the social worker. The psychiatric evaluations ranged from normal to psychotic behavior but the small number of cases warranted only two categories: presumed normals, and deviants (behavioral, neurotic, and psychotic, i.e., functional and/or organic).

In the original study, the drawings were appraised by two methods. The first method consisted of rating the drawings by use of a 20-point scale, one for boys and the other for girls, developed by Lorge and Dunn, to evaluate holistically the maturity of representation of drawings by children and adolescents. The second method consisted of evaluating the drawings by the use of seven criteria: (1) identification of the sex of the respondent from the drawing; (2) intactness, i.e., no omission of a major part of the body, e.g., legs, arms, hands, feet, torso; (3) integration, i.e., evidence of body gestalt; (4) depth (tri-dimensionality or the impression of solidity) rather than

flatness; (5) good proportion of the body parts; (6) absence of bizarreness; (7) evidence of adequate motor coordination. A numerical weight of one was given for each of the seven criteria. A high criteria score indicates a more intact drawing than a low criteria score. This method of appraisal was used since the Lorge-Dunn scale failed to take into consideration important qualitative differences between the drawings by children and adolescents and those by younger and older adults. Since the correlation between Lorge-Dunn scale score and criteria score was quite high, .75 for women and .93 for men, only the data for criteria will be reported.

C. RESULTS

If the hypothesis that the drawings show increasing loss of intactness with age be valid, then the drawings of the self by older adults should show less intactness (i.e., a lower criteria score) with age, less intactness for the institutionalized than for the non-institutionalized adults, less intactness for those with a C or D than for those with an A or B functional capacity rating, and should show less intactness for deviants than for normals. The data based on the samples of drawings studied do not support the hypothesis, but the rejection of the hypothesis should be interpreted with considerable caution because of the small number of cases.

For non-institutionalized women, the correlation between criteria score and age is $-.33$ which indicates that the drawings tend to show loss of intactness with age; but for institutionalized women, the correlation is $.32$ which indicates that the drawings tend to show greater intactness with age. For men, there is no correspondence between intactness of the drawing and age. The correlation between criteria score and age is $-.07$ and $-.01$ for the non-institutionalized and institutionalized men, respectively. However, none of the correlations between criteria score and age is significantly different from zero.

For women, the drawings tend to show less intactness for the institutionalized than for the non-institutionalized. The corresponding median criteria scores are 3.0 and 4.6, respectively. But for men, the drawings tend to show less intactness for the non-institutionalized than for the institutionalized. The corresponding median criteria scores are 2.8 and 4.3 respectively. For men and women combined, the drawings tend to be more intact for the institutionalized (median criteria score 3.8) than for the non-institutionalized (median criteria score 3.5). However, none of the differences between institutionalized and non-institutionalized adults is statistically significant.

For the institutionalized adults, there is no difference between the drawings by those rated A or B and by those rated C or D in over-all functional

capacity. The median criteria score for each group is 3.75. For the institutionalized adults, there is also no difference between the drawings by normals and by those who exhibited deviant behavior. For each group the median criteria score is 4.0.

D. DISCUSSION

The lack of correspondence between intactness of the drawing of the self with age, functional capacity rating, psychiatric evaluation, and place of residence suggests that the sharp differences between the drawings by younger and by older adults, found by Lorge, Tuckman, and Dunn, may not reflect physiological and psychological deficit, but may be due to other reasons. One reason, recognized in the original study, is that the samples are biased. Certainly the sample of younger adults and of older adults cannot be considered representative either of younger adults or of older adults in the population. Moreover, comparing sophisticated younger adults with older adults who have had different educational experiences and different cultural backgrounds, and who may react with insecurity in a testing situation, may be a questionable procedure. Another reason may be that many reference factors other than age, functional capacity, psychiatric status, and place of residence, may influence the adult's self-image. One important reference factor influencing an individual's self-image is acceptance of (and stereotyping of) the cultural attitudes toward aging. In general, the culture has looked upon aging as a process accompanied always by physical and mental decline, by economic insecurity, by disintegration of the family, and by rigidity of the older person's personality. This negative attitude toward aging was found in several studies where it was evident that there was substantial acceptance of the beliefs, misconceptions and stereotypes about old people and the older worker. This attitude toward aging is not limited to any one segment of the population. It was found among high school students, undergraduate students, graduate students, middle-aged non-professional workers and their wives, retired men and women residing in their own homes or living in institutions for the aged, and even among experts on the problems of aging (2, 4, 5, 6, 7, 10, 11).

Further studies indicate that the negative attitude applies not only to specific aspects of old people and the older worker but also to the general attitude toward aging (8, 9). Such negative attitudes toward aging are transmitted to, and acquired by, the individual quite early in life through environmental exposures, with concomitant reinforcements for such negative outlook by members of his family and other groups. Certainly by the time the child reaches the age of 12 or 13, he has acquired the negative attitudes about

aging found among adults. He has learned, as well, the generalized stereotype of "oldness," not only holistically, but also by its specifics, e.g., gray hair, "crow's feet," wrinkles, slow gait, etc. As a consequence of the internalization of the notion of "oldness" as "disability," the individual who begins to show some of the stigmata attributed to "oldness" as he grows older may accept the stereotype for himself. This suggests that the drawings by the older adults may not reflect physiological and psychological deficit but rather acceptance of the cultural attitude that looks upon aging in terms of disability.

However, it may well be that the drawings by older adults reflect two opposing forces. One is the tendency for the individual to idealize himself by portraying himself as he was in his prime, or as he would prefer to be. The other is the tendency to underrate himself by portraying himself as the culture expects him to feel and behave. These two opposing forces may cancel each other out. What is left may largely represent his actual self-image which shows a loss of physiological and psychological intactness.

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COMPARISON OF ANXIETY PATTERNS IN ADOLESCENT BOYS: 1939-1959*

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A. INTRODUCTION

There is substantial agreement among psychologists that anxiety patterns are to some extent culturally determined. Very little has been done, however, along the lines of evaluating the changes brought about by shifts in cultural patterns. Adolescents seem to be particularly sensitive to the influence of the culture in which they grow up. The influence of social class (6) and status difference (4, 5) have been pointed out. But the manner in which socio-cultural differences function over more extended periods of time has been relatively uninvestigated. We hope to indicate some changes of this nature in the present paper.

B. PROCEDURE AND RESULTS

In 1939, Fleege (2) administered a questionnaire to 2,000 Catholic high school boys, selected from 20 different schools. In 1959, an adaptation of Fleege's questionnaire was presented to 1,278 Catholic high school boys selected from nine different schools. The questionnaire was presented in the same manner as in the Fleege study. For purposes of the present study, the responses to 22 questions were selected as indicative of anxiety patterns. Fifteen of these questions called for a categorical response and were interpreted as indicating the presence or absence of anxiety in the students. The remaining seven questions were free-response items and the responses to these questions are taken as indicating the areas which give rise to worries and anxieties in the adolescent. Both sets of questions have been analyzed more thoroughly in previous studies (7, 8).

The first set of questions indicating the presence of anxiety patterns were as follows:

1. Do you become discouraged easily?
2. Is your life at present happy?
3. Do you get into moods when you can't seem to cheer up?
4. Do you feel so conscious of your faults that you can't enjoy anything?

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5. Do you ever feel sad and depressed or "down in the mouth"?
6. Do you worry much about being able to find a job later on?
7. Do you feel pretty well satisfied with the life you have to live?
8. Do you feel everybody seems to understand you?
9. Is your school life happy?
10. Does getting low marks depress you seriously?
11. Do you worry over your studies?
12. Are you ever bothered by feelings of loneliness?
13. Does being shy cause you serious concern?
14. Have you ever worried about whether you were normal or not?
15. If you feel you are frequently misunderstood, does this puzzle or pain you?

The response differences were evaluated by a contingency chi-square (3, pp. 377-387). The results of the 1939 and the 1959 testing are contained in Table 1.

The second set of questions, which gave the subjects opportunity for free response, were the following:

1. What are the things you worry about most?
2. What is your biggest personal problem or difficulty in life? (If you haven't any, write "None.")
3. What are the things you fear most? (If nothing, write "Nothing.")
4. What are the things you usually have doubts about?
5. When you feel sad and depressed or "down in the mouth," what generally causes this feeling?
6. When you feel lonely, what do you think are the causes?
7. Mention the difficulty or problem in your school life that puzzles you most. (If you haven't any, write "None.")

For each question, the results were ranked in the order of frequency of response and a rank-order correlation was computed. The significance of the rank-order coefficient was evaluated by the "t"-test (1, pp. 165-167). Not all the responses are presented here; only the more frequent response categories are presented. The results for the second set of questions are compared in Table 2.

C. DISCUSSION

The differences between the response percentages for the first set of questions (Table 1) are significant in eight out of the 15 items. Significant differences are found in the number of boys who (a) become discouraged easily; (b) feel excessively conscious of their faults; (c) feel sad and depressed; (d) worry about finding jobs later on; (e) are bothered by feelings of loneliness; (f) become seriously depressed because of low marks;

(g) worry about whether they are normal or not, and finally; (h) are puzzled or pained because they feel misunderstood. In each instance, that percentage of those admitting to these concerns is significantly smaller in the 1959 study than in 1939. There is one exception: the percentage

TABLE 1
COMPARISON OF RESPONSE PERCENTAGES IN THE 1939 AND THE 1959 GROUPS

Question	Response	1939	1959	Chi-square
1	Yes	43.7	32.6	4.86*
	No	45.3	65.7	
2	Yes	77.9	68.2	2.25
	No—uncertain ¹	22.1	31.4	
3	Yes	77.3	85.8	2.12
	No	19.6	12.3	
4	Yes	75.1	60.4	4.77*
	No	24.9	39.2	
5	Yes	48.1	23.2	13.08**
	No	51.2	74.7	
6	Yes	100.0	81.0	20.61**
	No	0.0	18.5	
7	Frequently	10.0	8.1	1.97
	Occasionally	25.5	34.7	
	Rarely	63.3	56.8	
8	Frequently	15.7	13.7	0.37
	Occasionally	25.4	28.7	
	Rarely	57.4	54.5	
9	Frequently	6.3	8.0	2.91
	Occasionally	17.4	26.2	
	Rarely	75.6	64.2	
10	Yes	32.7	27.5	9.37**
	No	58.5	47.3	
	Uncertain	8.8	24.9	
11	Very much	13.5	5.9	3.15
	Somewhat— A little ¹	68.0	56.5	
	Not at all	18.5	22.5	
12	Yes	63.0	33.1	19.51**
	No	33.4	65.0	
13	Yes	65.1	68.1	3.47
	No	7.0	12.3	
	Uncertain	26.4	17.3	
14	Yes	52.5	53.1	10.61**
	No	17.3	30.8	
	Uncertain	29.7	12.5	
15	Yes	79.3	65.0	3.98*
	No	20.6	32.2	

* Significant at or below the five per cent level of confidence.

** Significant at or below the one per cent level of confidence.

¹ These categories were separate in the 1959 study, but Fleege (2) presents them in combination.

TABLE 2
RANK-ORDER CORRELATIONS OF RESPONSES TO THE SECOND SET OF QUESTIONS

Question	Response	1939	1959	r
1	School	1 (35.5) ¹	1 (53.8)	0.91**
	Family	2 (18.9)	2 (9.0)	
	Money	3 (18.8)	4 (5.4)	
	Future—vocation	4 (10.4)	3 (6.8)	
	Religion	5 (5.6)	7 (2.8)	
	Sex	6 (3.8)	5 (4.7)	
	Popularity	7 (3.5)	6 (4.1)	
	Sickness	8 (3.5)	8 (0.6)	
2	None	1 (30.2)	2 (19.8)	0.87**
	Sex	2 (24.2)	1 (27.2)	
	Vocation	3 (17.1)	4 (13.1)	
	School	4 (11.4)	3 (16.2)	
	Money	5 (8.4)	8 (0.8)	
	Popularity	6 (4.8)	5 (5.8)	
	Family	7 (3.6)	6 (3.8)	
	Religion	8 (2.7)	7 (1.6)	
	Failure	9 (2.3)	9 (0.6)	
3	Nothing	1 (44.8)	1 (30.1)	0.68*
	Low marks	2 (9.0)	3 (10.3)	
	Sin	3 (8.2)	6 (5.9)	
	Sex	4 (6.4)	7 (4.7)	
	Hell	5 (6.2)	2 (13.5)	
	Death	6 (5.9)	4 (7.2)	
	Future	7 (4.2)	5 (6.6)	
	God	8 (2.9)	9 (3.3)	
	Unpopularity	9 (2.5)	8 (4.4)	
4	Sex	1 (31.7)	2 (12.7)	0.82*
	Religion	2 (14.8)	1 (14.2)	
	Future	3 (12.1)	5 (2.7)	
	Vocation	4 (10.6)	3 (6.7)	
	School	5 (8.4)	4 (4.6)	
	Family	6 (6.1)	7 (1.2)	
	Popularity	7 (4.5)	6 (1.6)	
5	School	1 (14.9)	1 (25.9)	0.76*
	Sin—Sex	2 (11.4)	3 (9.9)	
	Arguments	3 (10.2)	6 (3.3)	
	Family problems	4 (9.6)	4 (4.2)	
	Disappointment	5 (9.0)	2 (14.8)	
	Unpopularity	6 (6.9)	5 (4.1)	
	Punishment	7 (5.3)	7 (2.4)	
	Sickness—death	8 (5.2)	8 (0.5)	
6	Lack of friends	1 (14.5)	2 (7.6)	0.00
	Nothing to do	2 (4.6)	7 (2.6)	
	Lack of social opportunity	3 (3.1)	5 (3.1)	
	Personality	4 (2.6)	4 (3.2)	
	Unpopularity	5 (1.6)	1 (12.1)	
	Sex	6 (1.1)	3 (4.9)	
	Different-interests	7 (0.8)	6 (2.8)	

* Significant at the five per cent level of confidence.

** Significant at the one per cent level of confidence.

¹ The number in parentheses indicates the per cent of the responses in a particular category.

TABLE 2 (continued)

Question	Response	1939	1959	r
7	None	1 ²	1 (44.6)	1.00**
	Subjects studied	2	2 (27.3)	
	Teacher	3	3 (6.6)	
	Homework	4	4 (2.6)	
	Popularity	5	5 (1.7)	
	Lack of interest	6	6 (0.9)	

² Fleege (2) indicates only the order of frequency without giving any percentage values.

of those who worry about their being normal is approximately equal in both studies, but the percentage who deny such feelings is higher in the 1959 study. These results seem to indicate a decrease in the intensity of anxiety in adolescent boys over the 20-year interim, but differences in economic background may tend to override these differences. However, the fact that, where significant differences are observable, they tend in the direction of greater complacency and a decrease in the frequency of worries would seem to indicate some sort of differential shift in the attitudes of adolescent boys.

The responses to the second set of questions give us some idea of the areas which give rise to worry and anxiety. The differences in the frequency with which particular problems are mentioned is not very great for the most part. The pattern of worries has changed very little; school, family, money, and the future carry most of the burden. Similar patterns are also found in personal problems: sex is high on the list, along with vocational problems and the school. Sex is slightly more important and vocation is slightly less important in 1959. There are a few changes in patterns of fear: the fear of hell, of death, and of the future loom much more on the horizon in 1959, whereas the fear of sin seems to be less prominent. The boys express doubts about sex and religion with considerably more doubt about sex expressed in 1939. Difficulties involving moral actions and sex were ranked much higher in 1939 than in 1959. This may be an indication of improved sex education, but the increase in sexual difficulties is undoubtedly linked to shifting patterns of sex attitudes in the culture. Feelings of depression are most marked in relation to difficulties at school. This is especially true in 1959. Boys tend to relate their depressed feelings to more general causes of disappointment in the 1959 group. As might be expected, the pattern of school worries is very much the same.

In all of these areas of anxiety, the pattern is much the same for both groups, the rankings showing significant correlations. A significant change,

however, is found in the causes of loneliness. The responses to this question may have to be qualified by a semantic difficulty, since it is difficult to distinguish without some extrinsic check the differences in meaning between "Lack of friends" and "Unpopularity." They may well be equivalent.

Care must be taken in the evaluation of these results since the complex of factors underlying the observed differences involves psychological, sociological and economic factors in diffuse interaction. There is no basis in the present study for fixing upon any pattern of these factors as explicative of results. Interpretation must also be qualified by the operational concept of anxiety employed here. Worries and fears as evidenced in the responses to our questions remain indeterminately related to other behavioral contexts. Thus the significance of these results should not be overextended. With regard to the subjects, they come from a middle class, Catholic background which includes training in a highly moral ethical code implied in the Catholic religion. Consequently, results based on this sample are not indicative of general population norms. This factor cannot be considered as operative in the differential results but it should not be overlooked in possible extrapolation.

D. SUMMARY AND CONCLUSIONS

This study reports the differential results of two administrations of a set of questions dealing with adolescent anxiety. The questions were selected from a questionnaire which was given to 2,000 high school boys in 1939 and again in 1959 to 1,278 high school boys. Data of this nature impose obvious limitations on the conclusions which can be drawn, but comparison of the respective results seems to indicate that there is significantly less worry and anxiety manifested by the high school boy in 1959 than by his counterpart in 1939. Although the high school boy of 1959 is more carefree than his predecessor of 20 years, the pattern of areas in which his anxieties, worries and fears arise is very much the same. Significant rank-order correlations were found between the two groups in regard to the causes of worry, personal problems, sources of fear and doubt, and feelings of depression.

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BOOKS

Now that there is a special APA journal completely devoted to the publication of book reviews, it is no longer necessary that other journals emphasize such publication. It has always been our conviction that book reviews are a secondary order of publication unless they carry information that is as equally important as the book. However, the publication of book titles is a very important service, and we shall continue to render that service.

In any given issue of this journal, we may continue to publish one or more book reviews, but we do not consider such publication a major function of this journal. In line with this policy, we can no longer pay for such manuscripts.

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